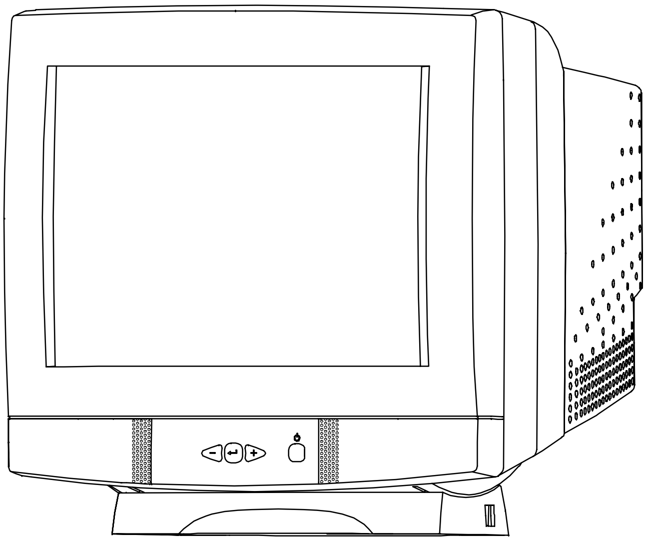
xx

Service Manual

Nokia Display Products Oy
P.O.Box 14
FIN−24101 Salo, Finland

Chassis 447O

17" High Resolution Colour Monitor 447ZAPlus



Contents

Level 1

Main Board module SMA231
SMA247
CRT module SMH156

When re−ordering manuals, please quote the model name and part number.

ZB1618
09.99

Service

Contents

Revision History

Rev	Date	Prepared by	Comments
09.99	10.09.99		

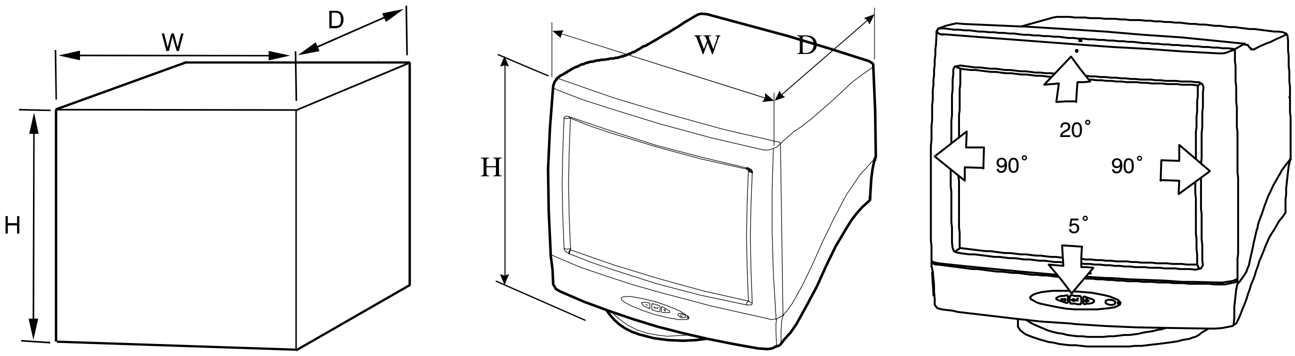
1. Product Overview

447O is a 17 inch monitor. The maximum resolution of 1280 x 1024 makes the monitor suitable for PC, Macintosh and workstation applications in normally heated, ventialed and controlled office/home environment. The monitor has an own power supply with nominal input voltage requirements from 100 V to 240 V.

1.1. Technical Specifications

Cathode Ray Tube	17” in diagonal 90˚ deflection angle Antistatic, antireflex Phosohor P22 medium short, Dot pitch 0.27 mm
Picture Size	300 mm x 225 mm with specified geometric distortion
Maximum Picture Size	325.9 mm x 242.8 mm, diagonally 406.4 mm (16,0”)
Power Input Requirements	Voltage 90-264 V, 50/60 Hz Current 1.8 A/110 V, 0.9 A/240 V
Power Dissipation	< 130 W Normal Operation < 100 W Stand-by < 10 W Suspend (with no audio signal and no USB loading) < 3 W Power off < 0.5 W Manual off
Memory Locations	18 for factory preset timings 6 for user adjusted timings
Geometric Distortion	The distance between bezel and active screen edge shall not vary more than 2 mm in both vertical and horizontal dimensions
Luminance	Min. 105 cdm^2 (Nits) at center, with full white field
Video Input	Input Signal: RGB, analog, max 0.7 V/75 W Horizontal addressability: 1280 dots maximum Vertical addressability: 1024 dots maximum
Synchronization Range	Horizontal: 30 kHz to 86 kHz automatic Vertical: 50 Hz to 150 Hz automatic
Synchronization Signal	Separate TTL, positive/negative Composite TTL, positive/negative
Max. Dot Frequency	160 MHz
Temperature	Operating: +10˚C to +40˚C Packed: -20˚C to +60˚C
Humidity	Operating: 15% to 85 % Packed: 5% to 95 %
Weight	19 kg net 22 kg gross

Size, Tilt and Swivel



Dimensions		447O159	447O151
Monitor	H	417 mm	432,3 mm
	W	422 mm	432,9 mm
	D	437 mm	441,3 mm
Package	H	567 mm	567 mm
	W	540 mm	562 mm
	D	596 mm	582 mm

1.2. Audio (Optional)

1.2.1. Connectors

Audio in L & R ⊖▸ RCA
Input level at clipping 2.0 Vpp
Mic line out ⊸
Head phone 3.5 mm
External mic 3.5 mm for electre condenser microphone

1.2.2. Amplifier

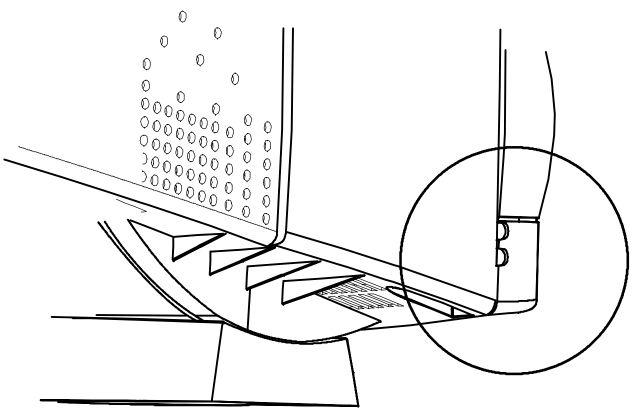
Output power 2 * 1.5 W (RMS) to 16 Ω load

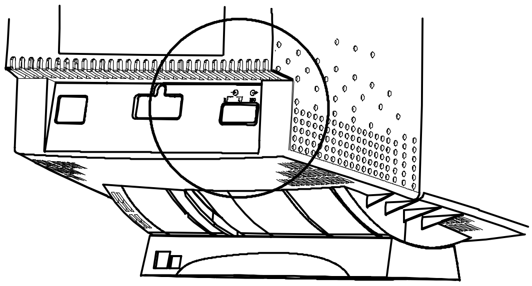
1.2.3. Loudspeakers

Nominal power 2W
Nominal inpedance 16 Ω
Frequency range 200 Hz – 18 KHz

1.2.4. Special Features

Volume–control	Adjusted via OSM or Menu knob
Balance–control	
Bass–control	± 12 dB
Treble–control	± 12 dB
National 3D sound	Enhanced stereo sound





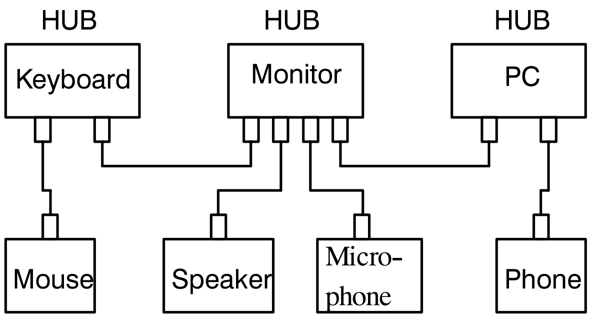
1.3. USB Subsystem (Optional)

1.3.1. General

USB is standard serial bus for connecting peripherals to your PC. USB is the key to true Plug and Play capabilities of your PC.

- USB enables you to attach and detach new peripherals while your PC is running.
- You don't have to wonder about which port of the PC you should use when plugging in a peripheral. since all four–pin USB connectors accept any USB peripheral to be connected, there is no way to do it wrong.
- Also the need for configuring and booting in adding or removing new peripherals disappears. USB itself detects and configures peripherals as soon as they are attached or deattached.
- It allows your system to grow in response to your needs without extra costs. In theory USB supports up to 127 devices.
- USB has a wide industry support among leading computer, telecommunications, electronics and software companies.

USB requires one host in any USB system: it is normally the PC. Only one USB device has to be in direct connection to the PC and the others can be connected through USB hubs. Each hub has downstream ports for attaching peripherals and one upstream port for connection towards the host. The picture below illustrates the USB system.



USB has two data bandwidths, which can be in use simultaneously:

- The high-speed bandwidth (12Mbps) supports multimedia and telephony devices
- The low-speed bandwidth (1.5Mbps) is dedicated for low-end devices like keyboards and mice

USB enables transferring compressed video for teleconferences, but it cannot handle moving video with high resolution.

USB devices can be divided into two categories, namely bus-powered and self-powered devices:

- Self-powered devices take their power from the mains supply
- Bus-powered devices rely on the power supplied by the USB cable. In the picture before low-power devices like keyboard and mouse can be called as bus-powered devices

Each USB cable segment provides +5 volts of power. The maximum length of USB cable segment is 5 meters.

The host in the system is responsible for allocating USB bandwidth for transferring information. Data transfer over the USB cable starts with synchronization information. This information is called the Token Packet. It includes information about the type and the direction of the transfer, USB device address and an endpoint number. After that follows the actual Data Packet or control information.

The destination of the transfer answers with a Handshake Packet as a mark of a successful transfer. USB error rate is very low, but in case of an error USB hardware will retry sending three times before informing the software about the error

In addition the host (or the PC) detects the attachment or removal of any USB device. All USB devices are attached to the USB through hubs. They indicate the removal or attachment of a USB device in their port status.

After that the host of the system enables the port and defines a unique USB address for the device. In case of a device removal the hub disables the port and gives an indication of device detachment to the host. If the added or removed device is a hub the above procedure must be performed for all the attached peripherals.

1.3.2. Universal Serial Bus Hub

The USB provides Plug and Play capabilities for peripherals. The bus physical interconnection is a tiered star topology. USB system provides hub for four downstream devides.

1.3.3. USB ports

Unit is capable to handle 4 connected downstream USB devides from the HUB. There are so 4 pcs serie A and one piece serie B for upstream (root) connectors in the rear of the monitor. These can be used for any PC based application as keyboard, mouse, printer, scanner, modem, etc.

Display controls and alignments via PC:

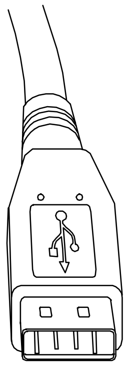
- Power mode: ON, Stand−by, Suspend, OFF
- Control codes: Brightness, Contrast, R Gain, G Gain, B, Gain, R Black Level, G Black Level B Black Level, H Position, H Size, H Pin Balance, V Position, V Size, H Moire, V Moire, Parallelogram Distortion, Trapezoidal Distortion, Tilt

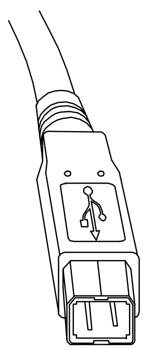
1.3.4. USB connectors

The data is transferred differentially meaning low radiation. The driver delivers initially ≥ 2V swing to the cable of $Z_0 = 90\ \Omega \pm 15\%$. Data signal rise time is 4 ns_{min} and 20 $ns_{min.}$ Add−on jitter from driver is < 3 ns. Maximum cable length is 5 m.

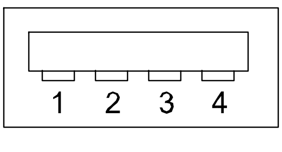
The differential receiver sensitivity is at least 200 mv. Maximum allowed jitter is 25 ns.

The port supplies 4,75V − 5,25V having current up to 0.5 A to the peripherals. Combined 3 port current limitation is provided for safety reasons. Current of the 0.5 mA is taken in suspend mode and starting current of 0.1 A is quaranteed.

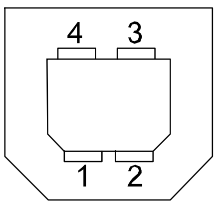




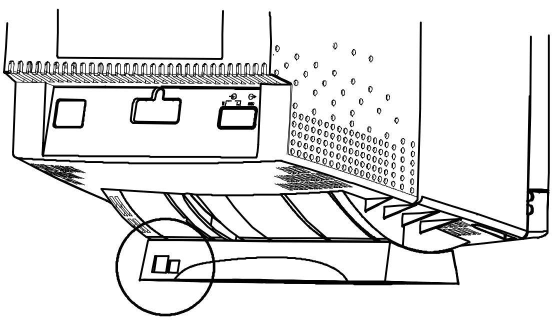
Type A (downstream)



Type B (upstream)



1. Vcc
2. Data -
3. Data +
4. GND



1.4. Certifications

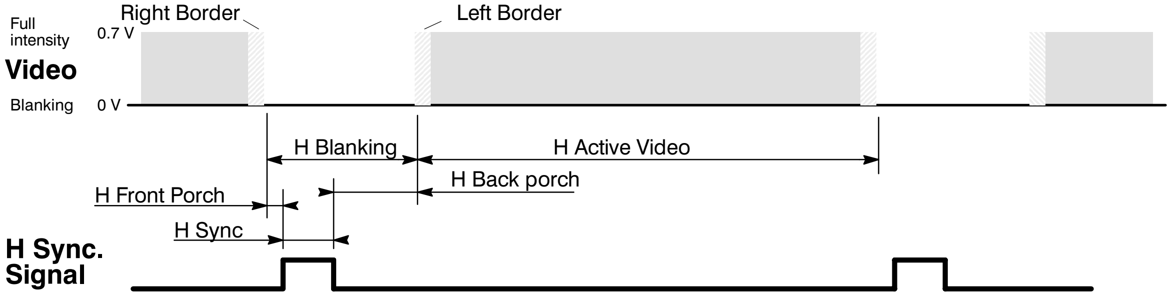
The monitor has following agency approvals

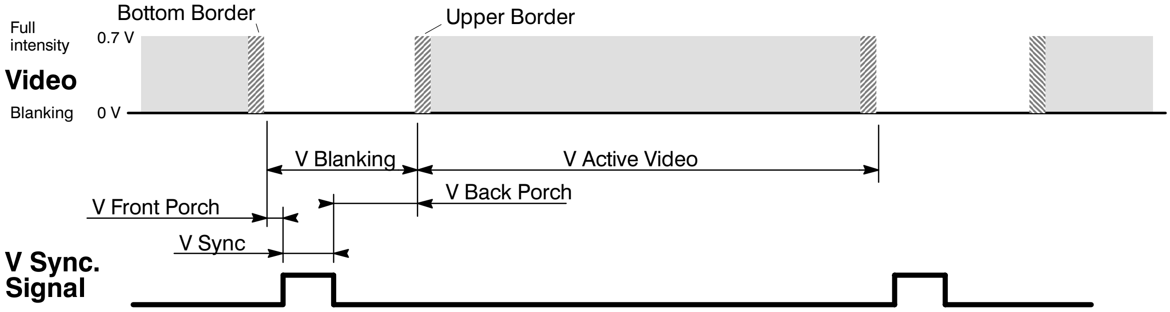
FIMKO, DEMKO NEMKO, SEMKO	EN60950; AM1; AM2; AM3 and AM4
GOST–R	Gost–R 50377–92, 50948–96, 29216–91, 50628–93, ISO9241–3, –8 and MPR1990; 10
TÜV–GS	EN60950; AM1; AM2; AM3 and AM4, ZH 1/618/10.80
TÜV–ERGO	MPR 1990:10 1990–12–31 (emission characteristics) MPR1990:8 1990–12–01 (emission characteristics) ISO 9241–3 (general requirements of the visual displays) ISO 9241–7 (requirements of reflections) ISO9241–8 (requirements of displayed colours) GS–VW–SG7/01.97
TÜV	ECO (readliness)
UL	UL 1950
CSA	CAN/CSA–C22.2 No 950–M89
TCO99	According to TCO'99 requirements
CE–mark	EN55022, Class B EN60555–2 EN50082–1 ADD 1992 EN60950: AM1, AM2, AM3 and AM4
FCC	ANSI C63.4 FCC Part 15 J, Class B
VCCI	Class B
FDA/DHHS	USA X–ray act

In addition, the following specifications will be fulfilled

EPA	Energy Star Program
Power Saver	VESA (DPMS) Display Power Management Signalling std ver 1.0
DDC	VESA (DDC) Display Data Channel ver 2.0 (DDC 2AB also DDC2Bi)

1.5. Preset Display Modes





Display Mode no	00	01	02	03	04	05	06	07	08	09	10	11	12
NCE	605	513	011	200D	300	306	30A	401	406	40A	501	506	603
V Frequency/Hz	75.0	85.0	75.1	70.1	59.9	75.0	85.0	60.3	75.0	85.06	60.0	75.0	60.0
H Frequency/kHz	79.976	68.677	68.861	31.467	31.472	37.500	43.269	37.879	46.875	53.674	48.363	60.023	63.981
H Period/us	12.504	14.561	14.560	31.780	31.774	26.667	23.111	26.400	21.333	18.631	20.677	16.660	15.630
Active Video/us	9.481	10.836	11.520	25.423	25.420	20.317	17.778	20.000	16.162	14.222	15.754	13.003	11.852
H Resolution	1286	1024	1152	1440	640	640	640	800	800	800	1024	1024	1280
H Sync/us	1.06	1.02	1.28	3.81	3.81	2.03	1.56	3.20	1.02	1.14	2.09	1.219	1.04
H Back Porch/us	1.84	2.20	1.44	1.91	1.91	3.81	2.22	2.20	3.23	2.70	2.46	2.235	2.30
V Period/lines	1066	808	915	449	525	500	509	628	625	631	806	800	1066
V Resolution	1024	768	870	400	480	480	480	600	600	600	768	768	1024
V Sync/lines	3	3	3	2	2	3	3	4	3	3	6	3	3
V Back Porch/lines	38	36	39	34	33	16	25	23	21	27	29	28	38
H Sync Polarity	+	+	–	–	–	–	–	+	+	+	–	+	+
V Sync Polarity	+	+	–	+	–	–	–	+	+	+	–	+	+
H Front Porch/us	0.12	0.51	0.32	0.64	0.64	0.51	1.56	1.00	0.32	0.57	0.37	0.20	0.44
V Front Porch/lines	1	1	3	13	10	1	1	1	1	1	3	1	1
Dot Frequency/MHz	135.640	94.500	100.000	56.640	25.177	31.500	36.000	40.000	49.500	56.250	65.000	78.750	108.000
Interlacing	no	no	no	no	no	no	no	no	no	no	no	no	no

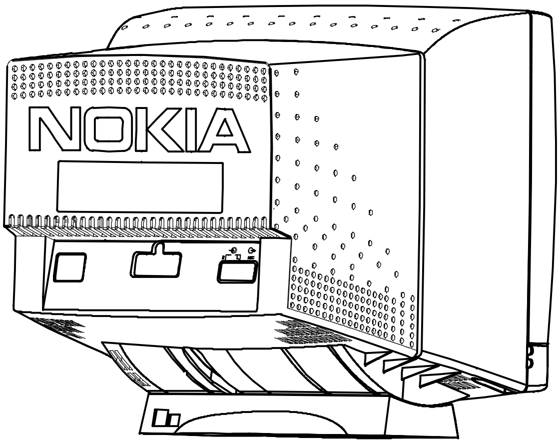
1.6. S-Capacitor table

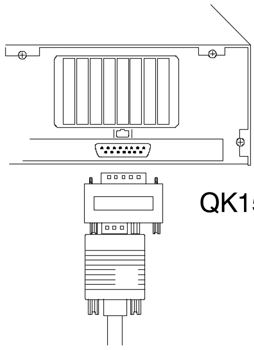
f/kHz	S5	S4	S3	S2	S1	S0	LIN1	LIN2
28000								
	X	X	X	X	X		X	X
32000								
	X	X					X	X
36000								
	X						X	X
40000								
		X	X	X		X	X	
44000								
		X		X			X	
49000								
					X	X		
50000								
			X	X	X			
54500								
			X		X		X	
59000								
			X	X		X		
62000								
				X		X		
67500								
			X	X				
72500								
			X					
78000								
				X			X	
80500								

1.7. Monitor Connection

Make sure that the monitor is disconnected from mains and the power switches of the computer and all attached devices are turned off before connecting the monitor.

- Connect the signal cable plug to the videocontroller connector at the back of the computer.
- Tighten the screws on the plug by hand.
- Connect the power cord first to the monitor and then to a grounded power outlet.





QK1518

If your computer is DDC compatible (PC)

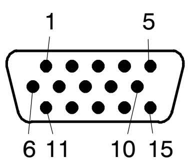
- Do not use any adapter when connecting signal cable to your computer.
- Do not extend the signal cable with extension lead. The DDC signals will not accept extended cable.

If there is no DDC in your computer

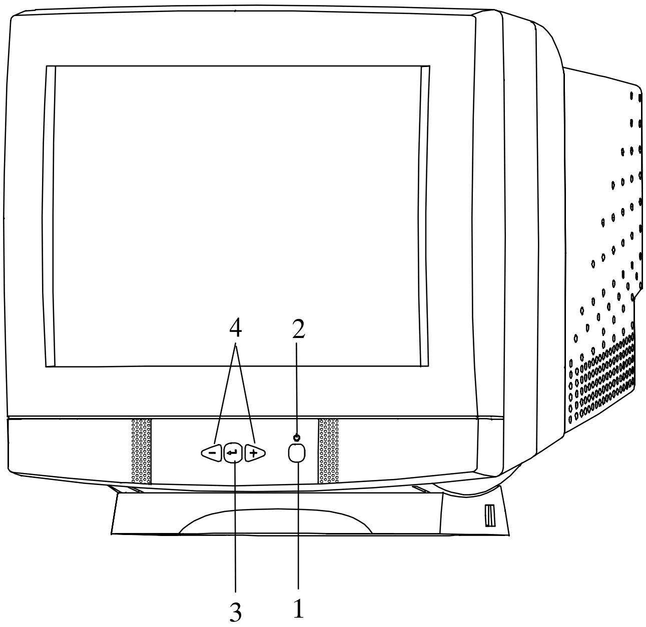
- Normally there is no need for adaptor when connecting signal cable to your computer.
  - Use MAC adaptor (QK1518) in signal cable when connecting the monitor to an Apple Macintosh computer. If the computer is equipped with separate display adapter card. It may have a standard D-SUB connector. In that case MAC adaptor is not needed.

Signal connector

Pin		*Signal*	
1	->	*RV*	*Red video*
2	->	*GV*	*Green video*
3	->	*BV*	*Blue video*
4	<-	*ID2*	*ID2 (Grounded)*
5			*Plugged/Unplugged (TEST)*
6		*RG*	*Red ground*
7		*GG*	*Green ground*
8		*BG*	*Blue ground*
9	->		*DDC +5V (optional)*
10		*LG*	*Logic ground*
11	<-	*ID0*	*ID0 tied to LG)*
12	<-	*SDA*	*DDC SDA*
13	->	*Hs*	*Horizontal synchronization, Composite synchronization*
14	->	*Vs*	*Vertical synchronization*
15	<-	*SCL*	*DDC SCL*



1.8. User Controls



1. Power switch
2. Power on indicator
3. Menu button
4. Select and adjustment buttons

When the power is turned on, the **power-on indicator** will light.
The colour of the the power-on light indicates the operating state of the monitor.

- Green: The monitor is in Normal, Stand–by or Suspend operation.
- Blinking Green: The monitor is in Automatic Power off state.
- Not illuminated: The monitor is turned off with power switch or disconnected from mains outlet.

⚠ The power switch does not disconnect the monitor from mains. In oder to make the monitor completely powerless, unplug the power cord from power outlet.

1.9.Menu

1.9.1. Moving in the menu

Menu operations are controlled with ↵ button and –/+ buttons.

ⓐ Call the menu to the screen by pushing ↵ button.
ⓑ Select the header with –/+ buttons.
ⓒ Push ↵ to confirm the selection.

Adjustment and settings corresponding the header appear below the header field.

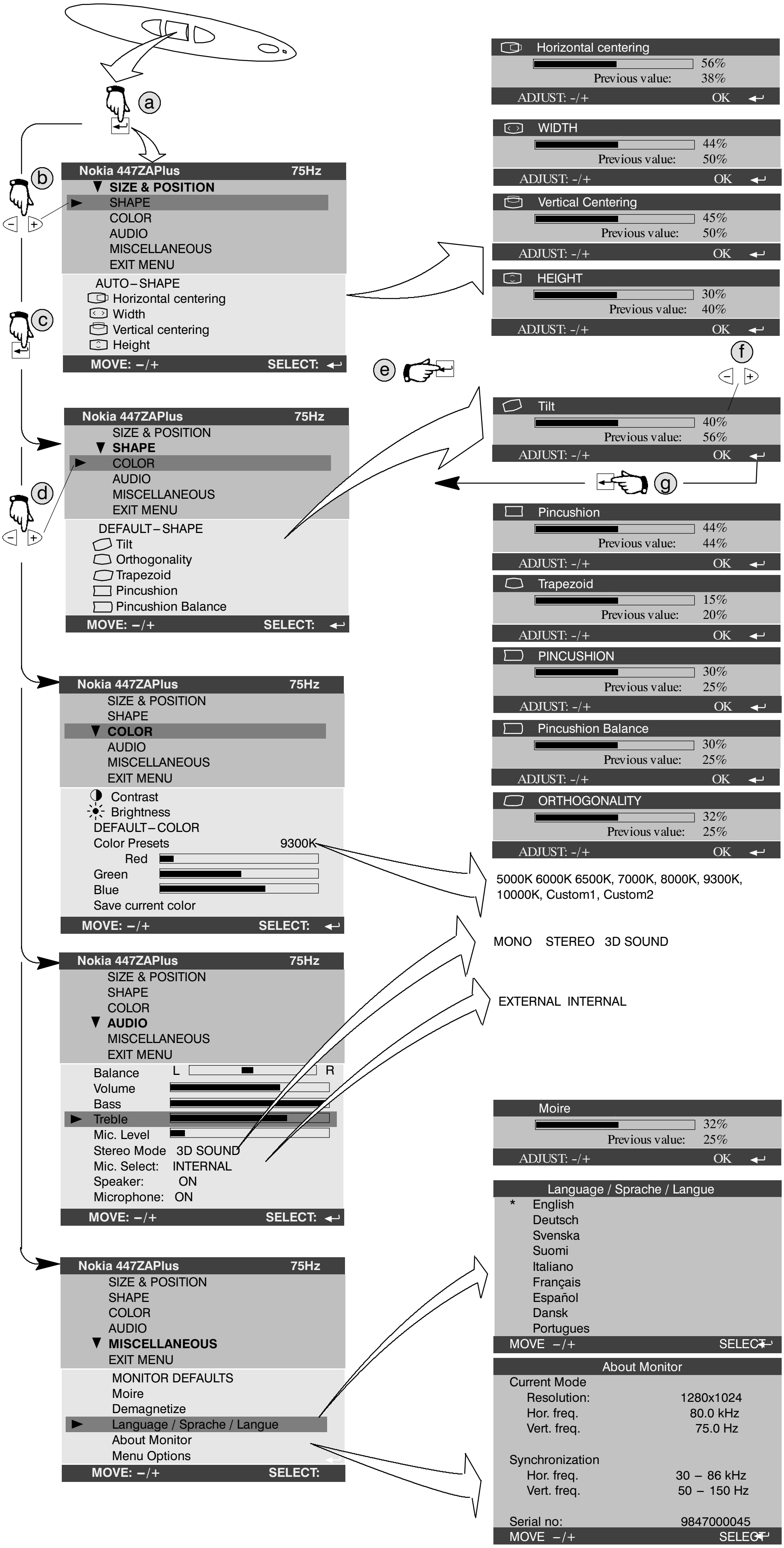
ⓓ Select the adjustment with --/+ buttons.
ⓔ Push ↵ to confirm the selection.

Menu disappears and a scale shows the position of the adjsutment. In addition to the bar, position of the adjustment is shown as a percentage of the maximum value. The upper number shows the current value and the lower one shows the value where the adjustent started.

ⓕ Adjust with –/+ buttons.
ⓖ When ready, push ↵ button.

1.9.2. Exit Menu

Select **EXIT MENU** and pushing ↵ button.


a
b
c
d
e
f
g
Nokia 447ZAPlus 75Hz
SIZE & POSITION
SHAPE
COLOR
AUDIO
MISCELLANEOUS
EXIT MENU
AUTO–SHAPE
Horizontal centering
Width
Vertical centering
Height
MOVE: –/+ SELECT:
Horizontal centering 56%
Previous value: 38%
ADJUST: -/+ OK
WIDTH 44%
Previous value: 50%
ADJUST: -/+ OK
Vertical Centering 45%
Previous value: 50%
ADJUST: -/+ OK
HEIGHT 30%
Previous value: 40%
ADJUST: -/+ OK
Nokia 447ZAPlus 75Hz
SIZE & POSITION
SHAPE
COLOR
AUDIO
MISCELLANEOUS
EXIT MENU
DEFAULT–SHAPE
Tilt
Orthogonality
Trapezoid
Pincushion
Pincushion Balance
MOVE: –/+ SELECT:
Tilt 40%
Previous value: 56%
ADJUST: -/+ OK
Pincushion 44%
Previous value: 44%
ADJUST: -/+ OK
Trapezoid 15%
Previous value: 20%
ADJUST: -/+ OK
PINCUSHION 30%
Previous value: 25%
ADJUST: -/+ OK
Pincushion Balance 30%
Previous value: 25%
ADJUST: -/+ OK
ORTHOGONALITY 32%
Previous value: 25%
ADJUST: -/+ OK
Nokia 447ZAPlus 75Hz
SIZE & POSITION
SHAPE
COLOR
AUDIO
MISCELLANEOUS
EXIT MENU
Contrast
Brightness
DEFAULT–COLOR
Color Presets 9300K
Red
Green
Blue
Save current color
MOVE: –/+ SELECT:
5000K 6000K 6500K, 7000K, 8000K, 9300K, 10000K, Custom1, Custom2
MONO STEREO 3D SOUND
EXTERNAL INTERNAL
Nokia 447ZAPlus 75Hz
SIZE & POSITION
SHAPE
COLOR
AUDIO
MISCELLANEOUS
EXIT MENU
Balance L R
Volume
Bass
Treble
Mic. Level
Stereo Mode 3D SOUND
Mic. Select: INTERNAL
Speaker: ON
Microphone: ON
MOVE: –/+ SELECT:
Moire 32%
Previous value: 25%
ADJUST: -/+ OK
Nokia 447ZAPlus 75Hz
SIZE & POSITION
SHAPE
COLOR
AUDIO
MISCELLANEOUS
EXIT MENU
MONITOR DEFAULTS
Moire
Demagnetize
Language / Sprache / Langue
About Monitor
Menu Options
MOVE: –/+ SELECT:
Language / Sprache / Langue
* English
Deutsch
Svenska
Suomi
Italiano
Français
Español
Dansk
Portugues
MOVE –/+ SELECT
About Monitor
Current Mode
Resolution: 1280x1024
Hor. freq. 80.0 kHz
Vert. freq. 75.0 Hz
Synchronization
Hor. freq. 30 – 86 kHz
Vert. freq. 50 – 150 Hz
Serial no: 9847000045
MOVE –/+ SELECT

2. Site Preparation

2.1. Location

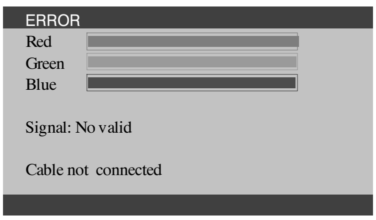
This Monitor is designed for normal office conditions. It is equipped with own power supply. It is not to be serviced or repaired on site

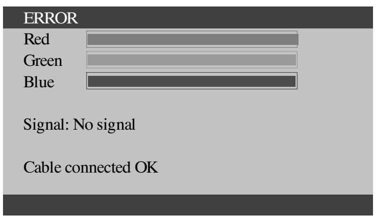
2.2. Troubleshooting

Local service facilities should perform simple maintenance such as trimming. More advanced maintenance and repair that requires replacement of components which in turn requires testing and re-trimming should be carried out in a central workshop.

Symptom		**Measures**
Picture screen is blank	The indicator on the front panel is not illuminated	Check that the power cord is correctly connected to the monitor and to the power outlet. If the monitor is powered through the computer, check that the computer is switched on with the mains switch. Use a desk light, for example, to verify that current is connected to a power outlet. If no electricity is connected to the outlet, call an electrician.
		Unplug the monitor from power outlet for about one minute.
	The indicator on the front panel is illuminated	Check that the signal cable connector is connected. If the connector is loose tighten the connector's screws.
		The Monitor might be in stand-by position. Push one of the buttons or move the mouse.
		Unplug the monitor from outlet for about one minute.
		Switch off the monitor and the computer. Remove the signal cable from the computer. Switch on the monitor using the power switch. If the Selftest menu appears on the screen, it is evident that the monitor functions correctly and the problem is caused by an error in other parts of the system.
		Check the signal cable's connection pins. If the pins are slightly distorted, use nose pliers to straighten them.
		The Selftest menu appears. The computer may use a timing values which are out of the monitor's synchronization range.
Picture has colour defects		Demagnetize the monitor.
		If colour defect is repeated without the monitor having been moved, it is possible that the monitor is influenced by a strong magnetic interference field (near to a high power cable, for example). Try to find a better location for the monitor or the interference source. Note that another monitor placed too near (less than 30 cm.) may also generate interference in the picture.
Picture has strong colour defect,		Open the Miscellaneous/Selftest menu. Check the colour of the Red, Green and Blue bars. If they have pure colours, the fault is not in the monitor. Check signal cable connectors and the computer. If the menu itself and the colour bars are discoloured, the monitor is obviously damaged.
Picture is stable but distorted		Your computer may use a timing for which the corresponding picture characteristic adjustments have not been set at the factory. Adjust the picture characteristics
Picture is unstable		Check the proximity of other electrical devices that generate magnetic fields, such as speakers, other monitors, electric fans and fluorescent light fixtures. Make sure your computer and video card are properly configured for your monitor.

The automatical appearance of the Error menu on the screen means that the signal is faulty or missing.





2.3. Checking the Operation of PowerSaver

The proper operation of the function requires a computer with VESA DPMS power management capabilities. Note that the power saving feature must be activated in the computer when checking the operation.

State	Colour of the power-on indicator	5V	Heater	12V	Video
Normal Operation	Green	Yes	Yes	Yes	Yes
Stand-by	Green	Yes	Yes	Yes	No
Suspend	Green	Yes	Yes	No	No
Power Off	Blinking Green	Yes	No	No	No



DPMS (Display Power Management Signaling) is a trade mark of Video Electronics Standard Association (VESA)

3. Controlling the Memory for Picture Adjustments

The picture adjustment values are stored in non-volatile memory. The memory has separated areas for User Adjustments and for Factory Adjustments.

3.1. Memory for User Adjustments

3.1.1. Adjustment

1 If there are values available in the memory for user adjustments, corresponding to the present timing signals, they are always used.

2 New user made adjustments are stored to the memory for user adjustments.

3.1.2. Resetting the User made settings for geometry or image

3 User memory can be emptied from user made settings. **Resetting affects only the timing which is currently active**. The reset function is inhibited if no corresponding factory preset display mode exists.

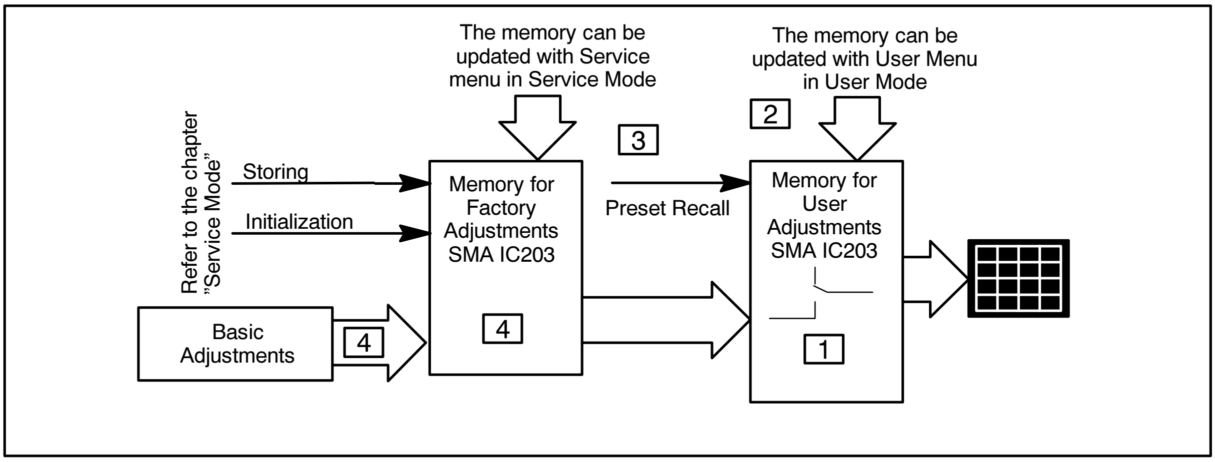
After resetting all picture properties are coming from memory for factory adjustments.

3.2. Memory for Factory Adjustments

3.2.1. Adjustment

4 Factory adjustments can be updated with service menu in service mode. If there is no location in factory adjustment memory for timings currently in use, the adjustment affects the memory for user adjustments.

- If the memory location mentioned in case 1 is empty, the picture adjustment values are read from memory for factory adjustments. Factory adjustments, corresponding to the current timings, are transferred to user memory if any picture property is adjusted. After that the operation is as in case 1.



4. Service Mode

Service Mode is needed for updating of the factory adjustments for timings listed in the chapter Preset Display Modes. If there is no location in factory adjustment memory for display mode currently in use, the adjustment affects the memory for user adjustments.

4.1. Grouping of the adjustments

There are three groups of software adjustments in service mode:

- Geometry set
- Grey scale adjustment set

The following table shows how the adjustments act in relation to the display modes.

Adjustment	Common for all Display modes	Separate for each Display mode	Available in User Mode	Available in Service Mode
Horizontal centering		X	X	X
Vertical centering		X	X	X
Height		X	X	X
Width preset	X			X
Width		X	X	X
Pincushion		X	X	X
Pincushion balance		X	X	X
Trapezoid		X	X	X
Orthogonality		X	X	X
S-correction		X		X
C-correction		X		X
E/W corner	X			X
Tilt	X			X
Moire	X		X	X
V. Moire	X			X
Raster	X			X
G2	X			X
Min contrast	X			X
Max contrast	X			X
R Black level	X			X
G Black level	X			X
B Black level	X			X
R Ampl	X		X	X
G Ampl	X		X	X
B Ampl	X		X	X

Common adjustments need to be adjusted only once. Separate adjustment must be performed for every display mode to be stored

4.2. Service Menu

4.2.1. Access to Service Mode

Activete the service mode always in 79.976 kHz/75 Hz (NCE605).

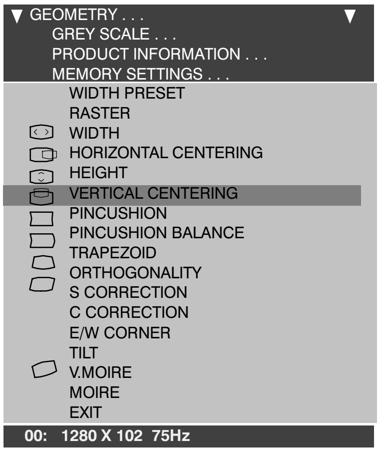
First switch OFF the monitor with power switch.

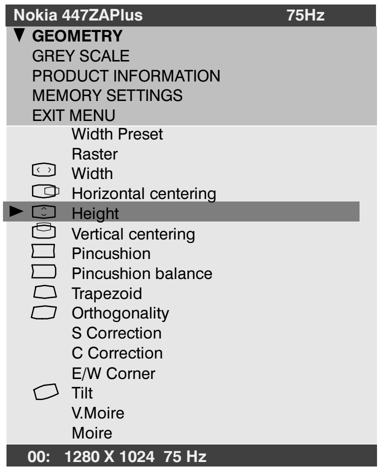
1) Push ↵ button down.
2) While keeping ↵ button down, switch ON the monitor.
3) Release ↵ button **when the power–on indicator is illuminated.**
4) Press ↵ button.
5) Monitor ask password. Type the password (7711) with the – /+ buttons.
6) Press ↵ button.

Select the items in the Menu with the – or + buttons. Push the ↵ button to open Geometry, Grey Scale, Product Information or Memory Settings. Adjust each property with the – or + buttons.

4.2.2. Geometry

Geometry submenu contains placement, size and shape adjustments.



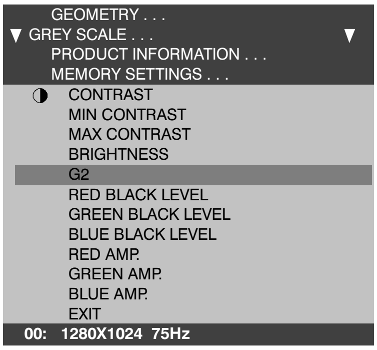


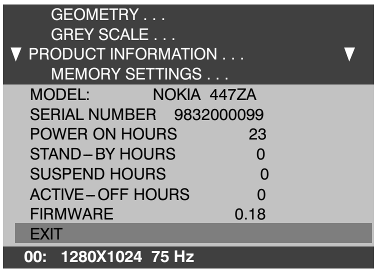
4.2.3. Grey Scale

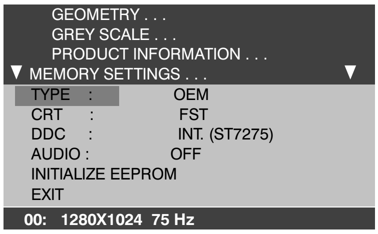
This monitor has six preset tints. With tint numbers smaller than 3 the picture becomes reddish and with tint numbers greater than 3 the picture turns blue.

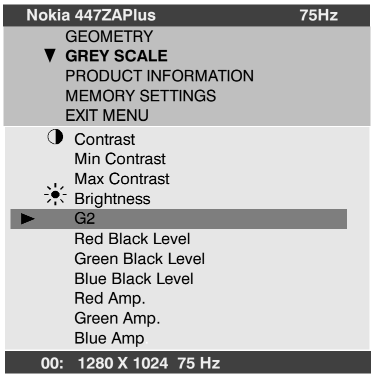
Tint no	1	2	3	4	5	6	7
Colour Temperature	5000K	6000K	6500K	7000K	8000K	9300K	10000K

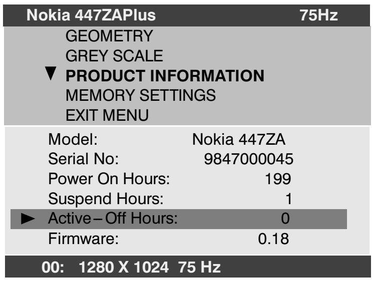
The grey scale adjustment affects directly tint number 6 (9300K) only. Other tints are derived automatically from 9300K colour temperature.

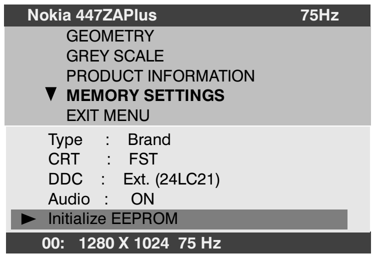












4.2.4. Memory settings and Initializing the Replacement IC203 on SMA board

If the memory for factory adjustments is replaced, it must be initialized. During initializing all memory locations are written with approximate values. They must be updated in service mode as explained in the chapter 'Adjustment Procedure'.

- Activate service mode as explained before.
- Select Memory settings –menu.
- Select Monitor type OEM, the type of the CRT (FST or AG), DDC (INT or EXT) and AUDIO (ON or OFF)
- INTIALIZE EEPROM always with using display mode no 00! (79.976 kHz/75 Hz (NCE605))
- Select INITIALIZE EEPROM.
- After initializing switch OFF the monitor.

Monitor	4470
Type	Brand
CRT	FST
DDC	Ext(24LC21)
Audio	ON

Caution
Initializing of a programmed memory IC deletes all user and factory made adjustments.

4.2.5. Storing the Adjustments

When the adjustment is ready, return to the menu by pushing the ↵ button. Adjustement will be stored automatically.

4.2.6. Exit from Service Mode

Switch off the monitor.

5. Workshop Maintenance

5.1. Important Safety Notice

The components, which are important for safety, are marked with special mark ⚠ on the circuit diagram. It is essential that these critical parts should be replaced with manufacture's specified parts to prevent X-radiation, shock, fire or other hazards.

For your own safety, use always safety isolating transformer when repairing the monitor.

5.1.1. Discharging the CRT

High voltage circuitry includes bleeder resistor which normally discharges the tube in about 5 seconds after the power is switched off. If you - for safety reasons - want to be sure about the discharging, do as follows:

Wear safety goggles. A cracked CRT may implode when discharged.
The signal cable must be disconnected from the computer.

To discharge the CRT, a flat-head screwdriver with grounding cable is required.

- Disconnect the signal cable.
- Connect the metal chassis of the monitor to reliable earth.
- Connect the grounding wire to the screwdriver.
- Connect the other end of the grounding wire to the chassis (earth).
- Insert the screwdriver under the rubber cap of the EHT connector to discharge the tube.

5.2. ESD-Sensitive Parts

To prevent damage, when working with electrostatic discharge (ESD) sensitive parts, observe the following instructions:

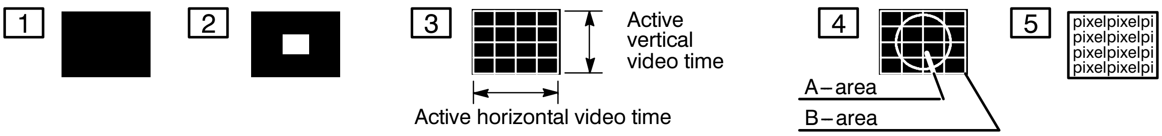
- Keep the ESD-sensitive part in its original shipping container until you are ready to install the part into the component card.
- Just before touching the ESD-sensitive part, discharge to the monitor any static electricity in your body; do this by touching the metal frame or cover of the machine. If possible, keep one hand on the frame when inserting or removing a logic card, for example.
- Hold the ESD-sensitive part by its edge; do not touch its pins.

5.3. Test Equipment

The following test equipment are required to adjustment procedure.

- Safety isolating transformer
- Digital multimeter: Fluke 87 or equivalent true RMS multimeter
- High voltage probe: e.g. Fluke 80-40k
- Signal generator: VTG220 + PC or programmable video generator
- Colour analyzer: e.g. Minolta TV Colour Analyzer CA100
- Convergence Gauge (CM7AR or equivalent)
- Oscilloscope 40-100 MHz band width
- Hi-Pot tester (Flash tester with insulation measurement / Leakage current / Break down voltage)
- ESD protection necessary

5.4. Test Patterns



[1] Black Picture
- Signal level = 0 V at each RGB input

[2] Highlight grey scale tracking
- Signal level = 700 mV in the window at each RGB input

[3] Crosshatch Picture
- Squares e.g. 20 mm x 20 mm
- Outmost lines correspond the active vertical/horizontal video time

[4] Convergence test pattern

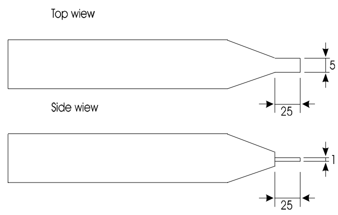
[5] Focus test pattern

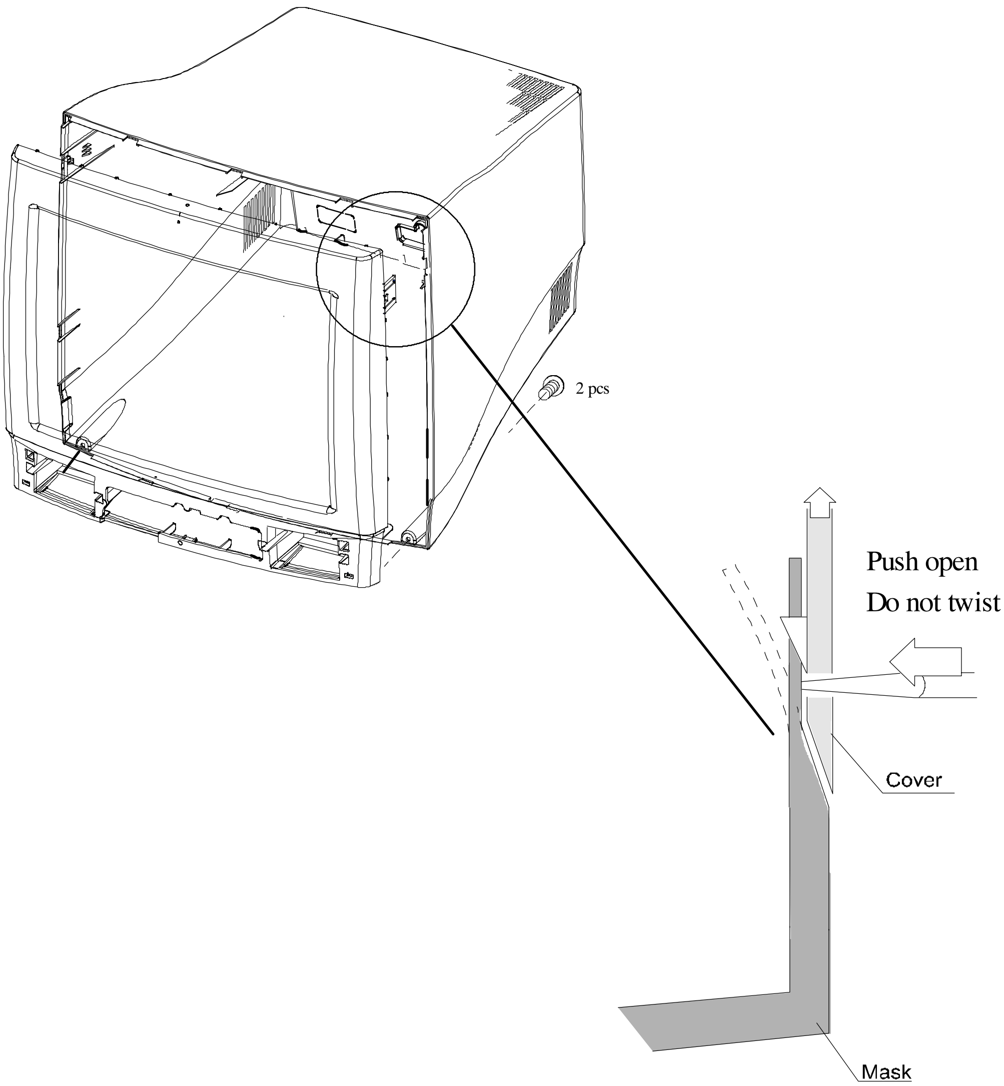
5.5. Disassembly

5.5.1. Cabinet

Set the monitor on cushion picture tube facing down

1. Loosen and remove two screws.
2. Open the plastic pawls with a screwdriver or special tool (for instance 860006)





6. Image Performance

The verificztion of this specification shall be made with equipment that measures the displayed image as if it were projected forward onto flat panel tangent to the centre of the CRT face plate surface and perpendicular to the Z-axis of the CRT.

The following specifications are applicable over specified input power conditions, specified environmental operating conditions and after being subjected to the specified non-operating environmental conditions. Before performance measurements are done the monitor must been in room temperature (20 ± 5°C) for at least 2 hours. After that the monitor must have been warmed up with the power on for at least 40 minutes.

The monitor shall be positioned to a magnetic field which is specified as 0 G horizontal field and 0.45 G vertical field (northern hemisphere) whenever image performance is measured. The monitor shall be degaussed before the performance measurement are done.

If there is no standardized magnetic field available, the monitor should be positioned face to east. All image performance specifications will be met in diffuse ambient 500 lux.

6.1. Active Picture Size and Location

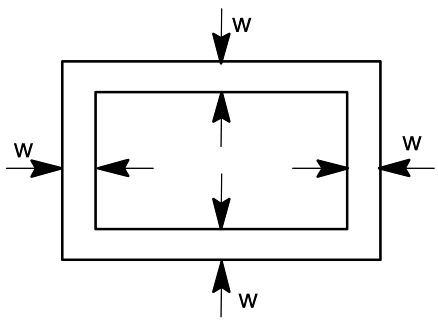
- Definition: Picture size is defined as the width and height of the display using the active raster, not including the border.
- Measurement: 16 x 12 Cross-hatch test pattern. Full white field illuminance 95 cdm^2 (Nits). The width and the height are measured via the centre of the screen.
- Requirements: Width = 300 mm ± 3.0 mm
  Height = 225 mm ± 3.0 mm

  Over the full range of operating temperature the size shall not change more than ±3.0 mm.

  The tolerance for the location of the active picture centre is ±5.0 mm for preadjusted modes and for preload modes it is ±10.0 mm. The location is measured from the bezel opening edge.

6.2. Geometrical Distortion

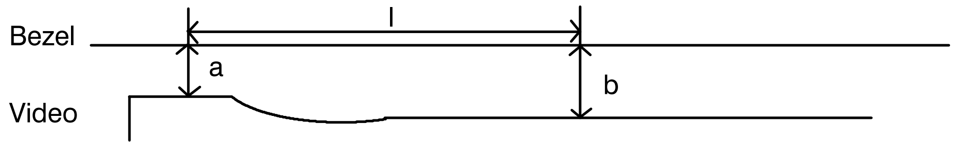
- The distance between bezel and active screen edge shall not vary more than 2.0 mm in vertical and horizontal direction. For preload modes 4.0 mm.
- The requirement must be fulfilled with all factory pre-set modes. The measurements are done with maximum output luminance.



6.3. Straightness of Line Segment

- Definition: For any segment of an edge of the active picture the deviation from being straight is defined as the distance from the straight line formed by connecting the end points of the segment under test to the point on the line segment furthest from that construction.
- Measurement: The deviation is to be measured perpendicular to the constructed line (see figure)

deviation = a-b
% deviation = (a-b/l) x 100 %



- Requirements: For line segments less than 50 mm the maximum allowed deviation is 1 mm.

0 – 50 mm	max dev. 1 mm
50 – 200 mm	max dev. 1.0 – 2.0 mm
200 –	max dev. 2.0 mm

This must be valid for vertical and horizontal lines.

6.4. Linearity

- Definition: Linearity is defined as a relative change in character dimensions.
- Measurement: 16 x 12 Cross-hatch test pattern. Brightness control is set so that the background raster has just extinguished and the contrast control is set to maximum.
- Requirements: For horizontal sync frequencies above 60 kHz
  The limits for vertical or horizontal non-linearity are 5 % between adjacent squares and 8 % between any squares.

  For horizontal sync frequencies below 60 kHz
  The limits for vertical or horizontal non-linearity are 8 % between adjacent squares and 12 % between any squares.

  The method of calculating linearity is: [(max-min)/max] x 100 < 8%
  The measurement is done via the centre point of the rectangle from center of the line to center of the line.

6.5. Phosphor Colour Coordinates

- Measurement conditions:
  Test pattern is full screen R,G or B field.
  Brightness control is adjusted for a background raster luminance level of cut off.
  Contrast control is adjusted to the maximum luminance level.
  Input signals R,G or B with maximum amplitude.
- Requirements: Phosphor CIE-coordinates

	X	Y
Red	0.625	0.340
Green	0.280	0.595
Blue	0.155	0.070

Tolerance of the colour coordinates will be < 0.020 in both X and Y direction.

6.6. Colour Temperature and Tracking

- The default colour temperature is 9300 K
- Measurement conditions:
  Test pattern 50 x 50 mm white field at the screen centre.
  Brightness control adjusted for a nominal background raster luminance.
  Input signals R,G and B with maximum amplitude.
- Requirements: When contrast control is adjusted from a luminance level of 100 cd/m^2 (Nits) to 30 cd/m^2 (Nits) the 1931 CIE X and Y coordinates measured at the screen centre do not vary more than
  X ± 0.015
  Y ± 0.015
  The color temperature user adjustment range is 5000 – 10000K.

6.7. Colour Purity

- Measurement conditions:
  Test pattern full screen R,G and B field.
  Brightness control adjusted for a background raster luminance level 2 cd/m^2.
  Input signals R,G and B maximum amplitude.
  After rotating the unit must be degaussed.
  Viewing distance 600 mm, for 5 second observation.
- Requirements: Colour purity is visually checked for each full raster primary colour. Tube facing east, west, north and south each primary colour raster shall have no colour impurity due to beam mislanding. For a full white field, if there is an area of observed impurity in colour, the difference in colour coordinates between that area and the center of the display area shall be less than x: ± 0.015 ;
  y: ± 0.0 15 In addition, the square root of the sum of the squares of the differences in x and y must be less than or equal to 0.015.

6.8. Luminance

- Definition: The following methodology and definition of luminance shall be applicable throughout this specification.
  Luminance shall be measured on 1280 x 1024 85 Hz pixel format at five areas, using two different pictures:
  1) In the center of the screen white field 50 x 50 mm.
  2) Full white field.

  The five areas are defined as:
  L0 Center of the screen
  L1 Upper left of the screen
  L2 Upper right of the screen
  L3 Lower left of the screen
  L4 Lower right of the screen

- Requirements: Nominal Brightness Luminance
  The center of brightness adjustment is targeted to 0.2 cd/m^2 (Nits)

  Maximum Contrast Luminance
  With the 1.0 cd/m^2 (Nits) brightness and the contrast control set to maximum measure the maximum luminance at the centre of the picture.
  Full white field: luminance $\geq$105 cd/m^2 (Nits)
  50 mm x 50 mm white field luminance 160 ±35 cd/m^2 (Nits)

  Minimum Contrast Luminance
  With the 1.0 cd/m^2 (Nits) brightness and the contrast control set to minimum measure the maximum luminance at the centre of the picture
  50 x 50 mm white field 1 cd/m^2 (Nits) $\leq$ (L0) $\leq$ 10 cdm^2 (Nits).

Luminance Uniformity
With full white field and with the brightness control set so that the back ground raster is just extinguished the contrast control set for a luminance of 100 cdm^2 (Nits) at the centre of the screen measure the luminance uniformity. The luminance at anywhere in the display area must be more than 75% of the luminance at the centre. This uniformity specification must be fulfilled the tube facing east,west,north and south.

Maximum Background Luminance
The luminance of the background, measured at centre of the screen, without active video and in the absence of significant ambient illumination, illuminance at the maximum must be
1 cd/m^2 (Nits) $\leq$ L0 $\leq$ 7 cdm^2 (Nits)

6.9. Convergence

- Definition: Misconvergence is defined as the distance between centres of the red, green and blue beams at the screen using rectangular coordinates. The centre is defined as the midpoint of the brightest portion of the beams.

- Measurements: Using a crosshatch test pattern adjust each gun to produce white dim lines. Adjust brightness control so that background will just disappear. Set contrast control to give a luminance level of 50 cd/m^2 (Nits) on white 50 mm x 50 mm square at the screen centre

- Requirements: For horizontal sync frequencies above 48 kHz:
  Inside a circle with a diameter equal to the height of the active screen $\leq$0.30 mm. Elsewhere inside the active screen area $\leq$0.40.

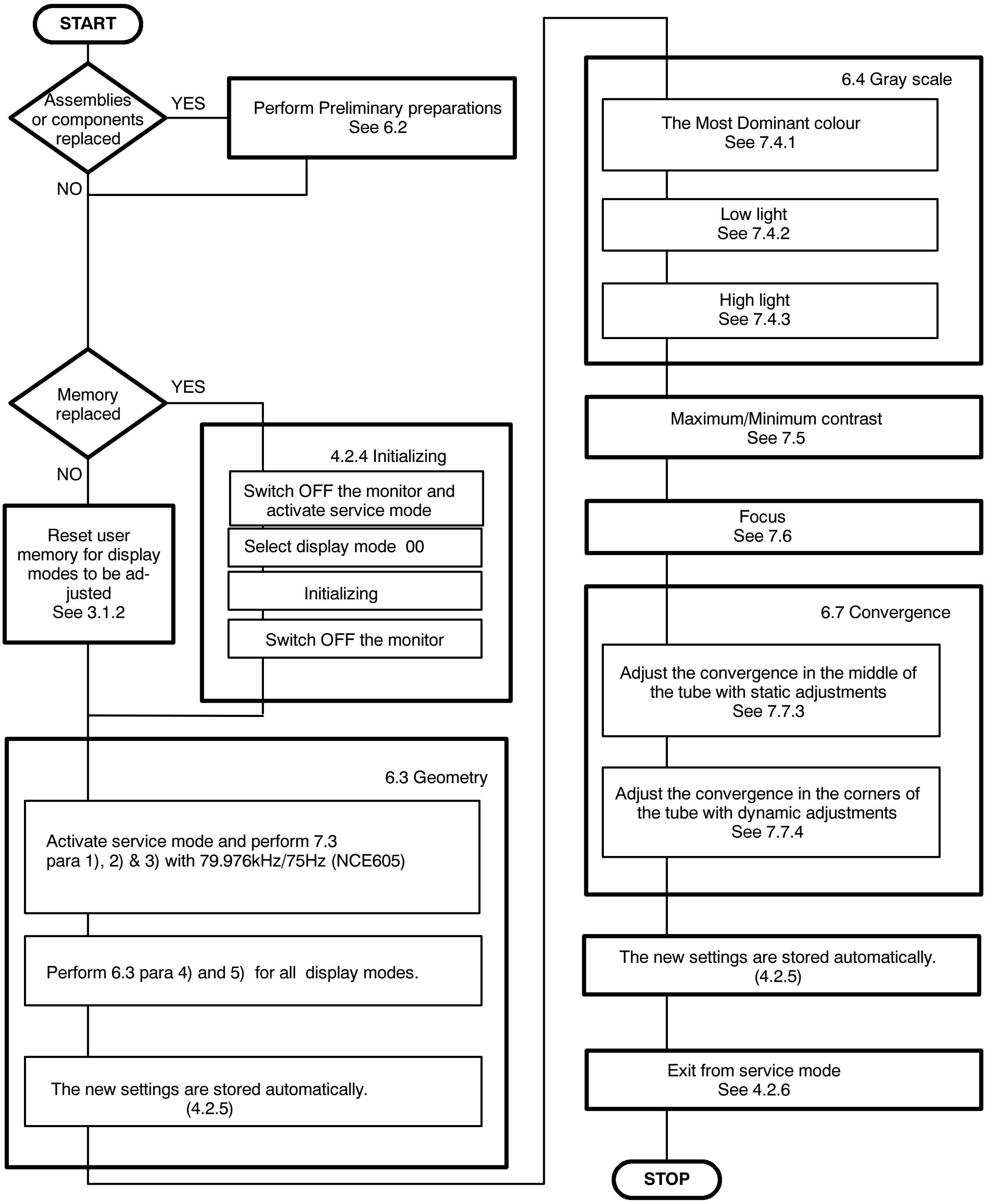
  For horizontal sync frequencies below 48 kHz:
  Inside a circle with a diameter equal to the height of the active screen $\leq$0.40 mm. Elsewhere inside the active screen area $\leq$0.50.

7. Adjustment Procedure

The following procedure must be carried out in case of large service operations e.g. when a circuit board or nonvolatile memory ICA has been replaced by a new one.

The order of adjustments explained here has been found to produce the desired result with the minimum of effort. Adjustments can also be made in another order or completely separately.

7.1. Adjustment Flow Diagram

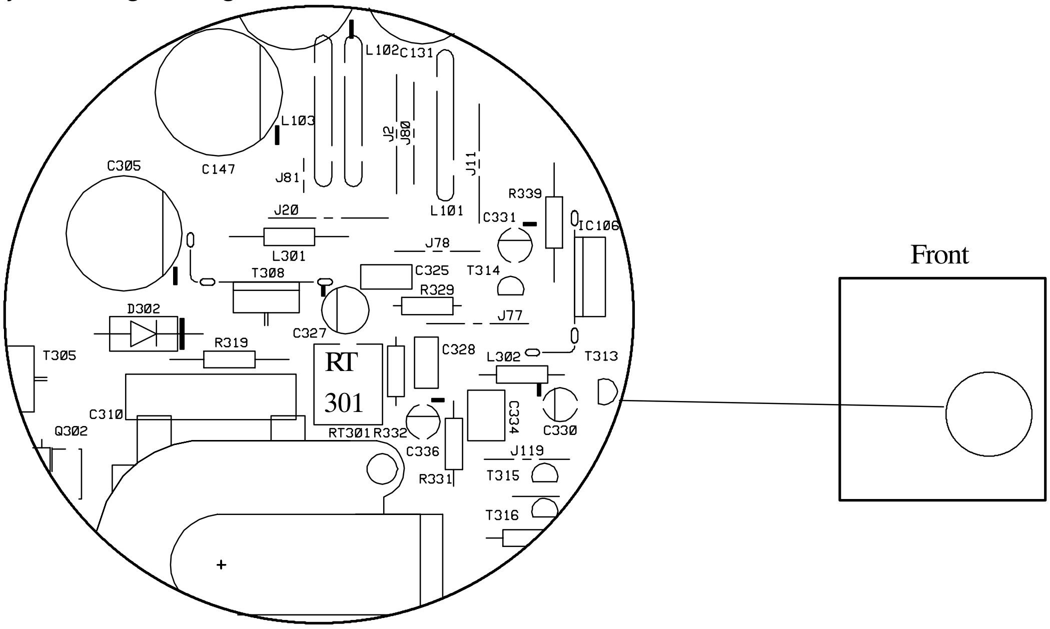


7.2. Preliminary Preparations

Connect the signal cable to the PC. Switch on the monitor and the PC. Let the monitor warm up for 20 minutes before starting the adjustments.

7.2.1. High Voltage

- Select 79.976kHz/75Hz (NCE605) crosshatch test pattern.
- Connect the high voltage meter to the anode of the picture tube.
- Adjust the high voltage to **26.0 ±0.2 kV** with **RT301** on SMA-board.



7.2.2. Coarse width

1) Select mode 00 (79.976kHz/75Hz (NCE605))
2) Set width to the 50 % with menu adjustment..
3) Adjust picture width to 300 mm with width preset

7.2.3. Preliminary Picture Adjustments

1) Select 79.976kHz/75Hz (NCE605) crosshatch test pattern.
2) Set ◑ to maximum and adjust ☼ to 70 % (faintly visible).
3) Adjust focus if poor.

Remember

- Do not adjust **G2**-voltage with potentiometer or menu if you have reason to belive that there is no need to adjust gray scale.

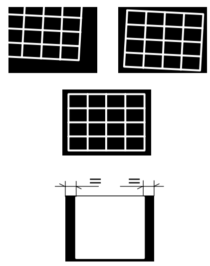
7.3. Geometry

Magnetic fields for following adjustments: vertical 0.45G and horizontal 0.0G.

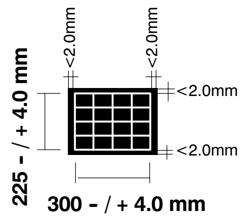
Activate Service Mode in 79.976 kHz/75.0Hz (NCE605).

Degaussing must be carried out before the picture adjustments. Degaussing shall be repeated if the monitor is moved.

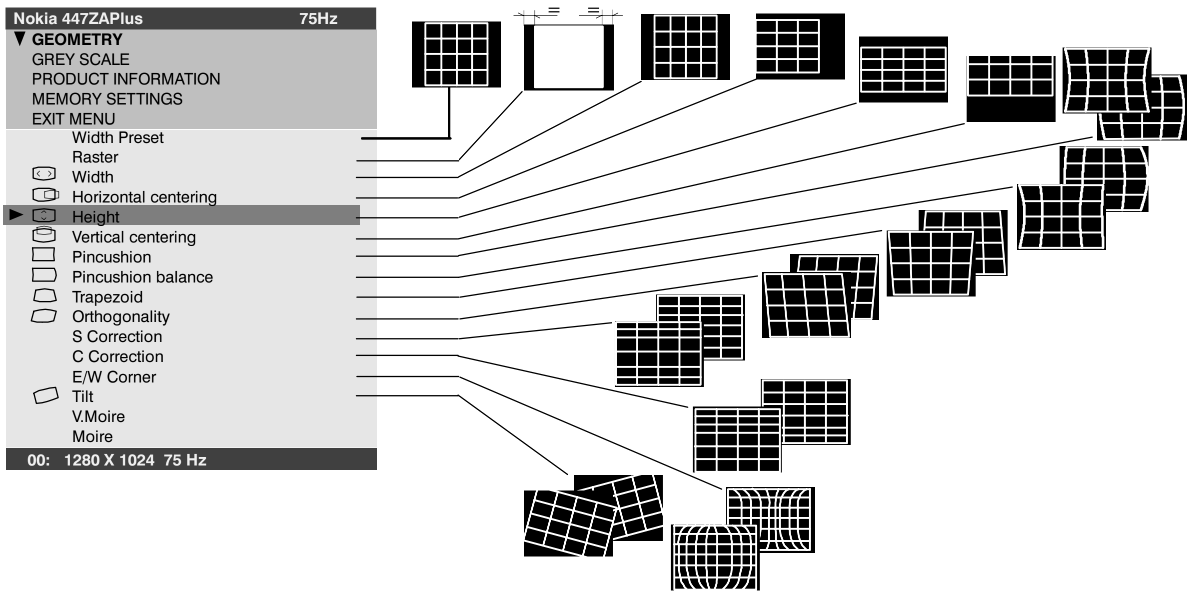
1) Select **79.976/75.0** (NCE605) crosshatch test pattern.
   Set ◑ to maximum and adjust ☼ until the background is faintly visible.
   Reduce width until both vertical edges of the **background** are visible.
2) Straighten the picture if tilted.
   This adjustment is common for all display modes.
3) Centre the background.
   This adjustment is common for all display modes.



4) Adjust size, position and shape of the picture equal to the mask aperture. Adjust first the properties with largest deviation from the correct value.
5) Adjust final width and height.
6) The distance between bezel and active screen edge shall not vary more than 2.0 mm in vertical and horizontal direction.



7) Repeat steps 4) and 5) for every display mode to be stored. Note that the display mode can be changed without leaving the service mode.



7.4. Grey Scale

The grey scale is adjusted for 9300K colour temperature.
Activate Service Mode in 79.976 kHz/75Hz (NCE605).

7.4.1. The Most Dominant Colour

The most dominant colour has been marked in a label on the deflection yoke. It may not be correct if tube or SMH card has been changed. In that case judge the most dominant colour from the tone of the picture after you have made the following adjustments.

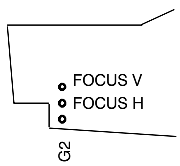


1) Select **79.976/75.0** (NCE605) black test pattern.
2) Set ☼ to maximum and ◑ to minimum.
3) Set Blacklevel adjustment **RED/GREEN/BLUE Black Level** to 12% of the maximum.
4) Set **RED/GREEN/BLUE Amp** menu and **G2 menu** adjustments to center (50%).
5) Place the probe of the colour analyzer in the middle of the screen and adjust with **G2 trimmer** until the picture illuminance is 2±1.0 cdm^{-2} (Nits)

7.4.2. Low Light



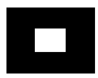
1) Select **79.976/75.0** (NCE605) black test pattern.
2) Adjust picture illuminance to 1.0 cdm^{-2} (Nits)with ☼ in servicemenu.
3) Adjust the ◑ in servicemenu to the minimum.
4) Adjust the colour coordinates to (9300K)
   x = 0.283±0.010
   y = 0.297±0.010
   with **RED/GREEN/BLUE Black Level** adjustments.
   Do not adjust the most dominant colour.
   During the adjustment check if brightness is chancing over tolerance, when needed adjust it back. If Y– and X–values are getting too far from ideal values it's better to adjust both colours back to 10 %. If any colour during adjustments is going under 10 %, you have chosen wrong MOST DOMINANT COLOUR. Check the dominant colour again according to the instructions.
5) Set ☼ to the maximum and check that the illuminance is still 2±1.0 cdm^{-2}. If not, adjust with G2 in service menu.
6) Adjust picture illuminance to 1.0 cdm^{-2} (Nits)with ☼ in servicemenu and check the colour coordinates.



Left side view of the chassis

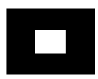
7.4.3. High Light





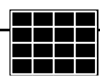
1) Select **79.976/75.0** (NCE605) black test pattern.
2) Adjust with ☼ the picture illuminance to 1±0.1 cdm^{-2} (Nits).
3) Select **79.976/75.0** (NCE605) window test pattern.
4) Adjust with ◑ the picture illuminance in the window to 100±5 cdm^{-2} (Nits)
5) Adjust with **RED/BLUE/GREEN Amp** the colour coordinates in the window to
   x = 0.283±0.003
   y = 0.297±0.003
   Check after adjustment that the illuminance reading is in limits.
6) Back to low light step 4) and check colour coordinates.

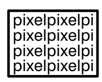
7.5. Maximum/Minimum Contrast



1) Set ◑ to the maximum.
2) Adjust with ☼ the picture illuminance outside window to 1.0 cdm^{-2} (Nits).
3) Adjust illuminance in the window to 160±5 cdm–2 (Nits) with **MAX CONTRAST**.
4) Set ◑ to the minimum.
5) Adjust the minimum illuminance in the window to 6.5 ± 1,0 cdm^{-2} (Nits) with **MIN CONTRAST**.
6) Exit from service mode.

7.6. Focus





1) Select **79.976/75.0** (NCE605) crosshatch test pattern
2) Set ◑ to the maximum and adjust ☼ to 70 % (background faintly visible).
3) Adjust the sharpness with **FOCUS H** and **FOCUS V** to optimum

4) Adjust ☼ until the background is invisible
5) Select focus test pattern. Check that all letters are clearly visible.

7.7. Convergence

Reduce first the convergence error in the middle of the screen to minimum using static adjustments. After the convergence is faultless in the middle of the tube, use dynamic adjustments to eliminate the error in the edges of the tube.

Static adjustments affects the whole picture area:
- Magnet ring set on the tube neck (horizontal + vertical)

Dynamic adjustments affects a part of the picture area:
- Deflection yoke trimmers.

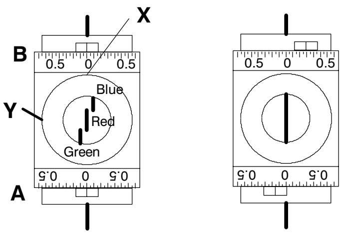
7.7.1. Measuring Conditions

- Adjust convergence with **79.976/75.0** (NCE605) line frequency.
- Make sure that focus is correctly set at the mid-point between the screen center and the edge of the picture.
- Use white crosshatch test pattern with circle.
- Adjust ◑ to near the maximum and reduce ☼ until the background disappears.

7.7.2. Convergence Measuring Gauge CM7AR

The use of the Klein CM7AR Convergence Gauge has been explained here but other types of gauges can be used as well.

Check that the adjusting knobs (A & B) are set to zero.
- Place the gauge on the line with marking **Y up** upwards when measuring horizontal line.
- Place the gauge on the line with marking **X up** upwards when measuring vertical line.
- If the line has convergence error, the line in the window seems to be broken.
- Use knobs A and B to adjust the line continuous.
- If the readings are on the opposite side of zero, the convergence error is A+B (e.g. 0.2 + 0.1 = 0.3).
- If the readings are on the same side of zero, the convergence error is equal to A if A > B or B if B > A

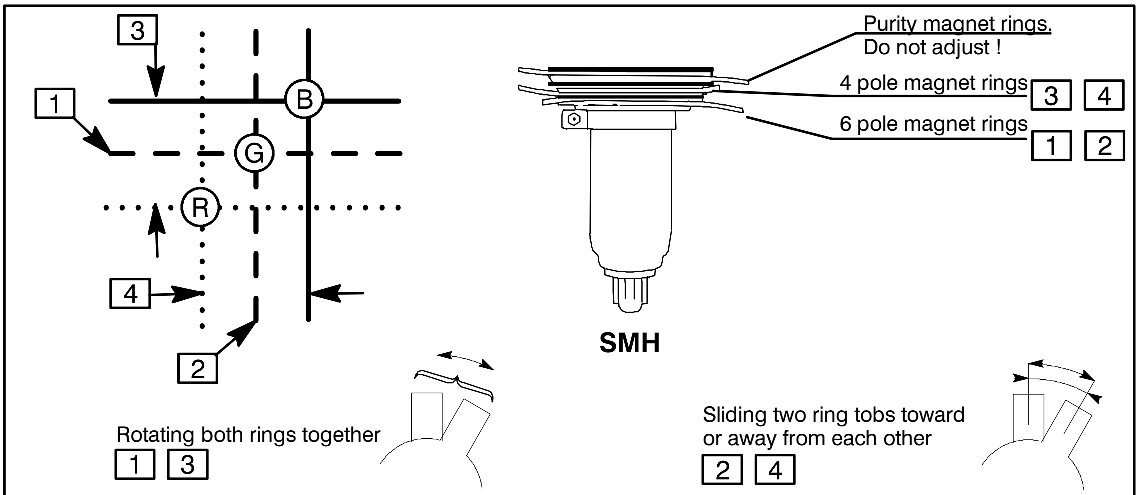


7.7.3. Static Convergence

The magnet rings has been set to the optimum in the factory. Readjustment is necessary only in case the adjusting magnets have been accidentally moved.

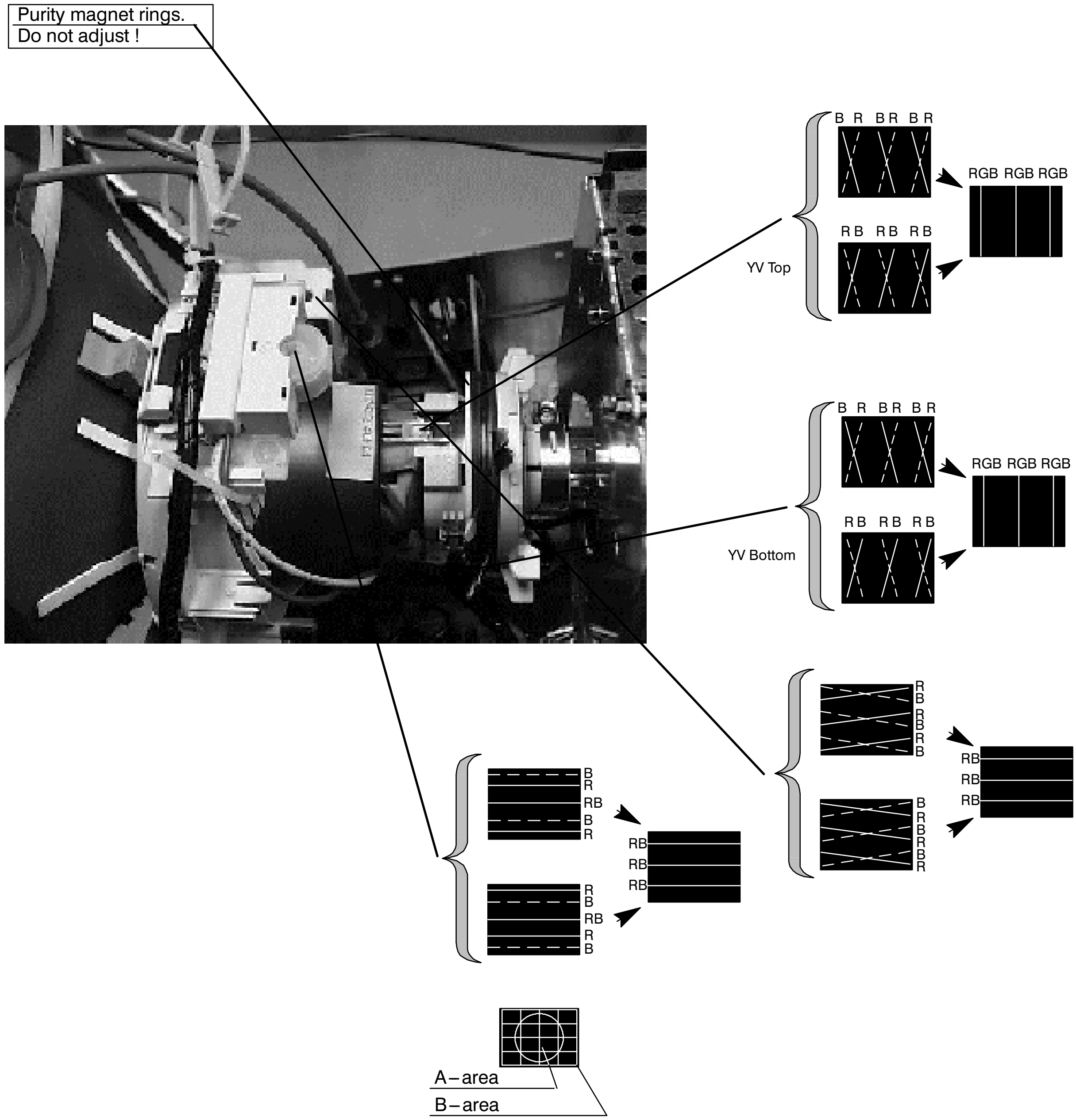
1 Adjust G vertically in the middle between R and B with 6 pole magnet rings.
2 Adjust G horizontally in the middle between R and B with 6 pole magnet rings.
3 Adjust R and B vertically to the same position with G line with 4 pole magnet rings.
4 Adjust R and B horizontally to the same position with G line with 4 pole magnet rings.

Lock the rings with paint.



7.7.4. Dynamic Convergence

Deflection yoke trimmers



7.7.5. Allowed Error Levels for Convergence

Area A $\leq$ 0.30 mm

Area B $\leq$ 0.40 mm

7.8. Colour Purity

Do not move purity magnet rings. If the purity magnet rings are found to have moved during transportation or handling, set them just in the original position by tracing the locking paint put on purity magnet rings and holder of beam bender and then readjust the static convergence.

8. Screen and faceplate Blemishes

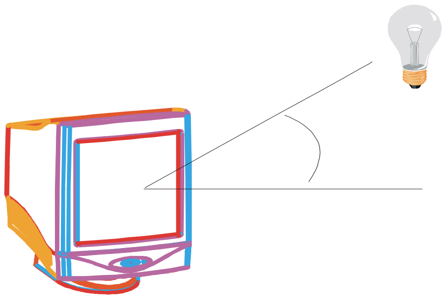
8.1. Preconditions of Measuring

Picture: White rasterpicture

Colour temperature adjusted according to specifications: X=0.283, Y=0.297

External Lighting: 1 Lux

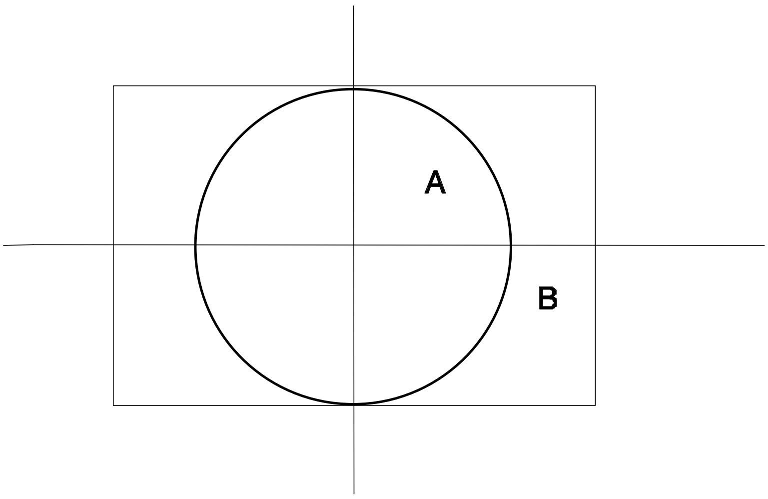
When examining the Tube without picture ("self test" –mode) external light intensity: 700 – 1000 Lux. To the middle of the screen angle 45°



Distance from the screen : approx. 60 cm

Zones:

Useful picture area (mm)



Tube's size : 41 cm = 17"

Picture's size: 300 X 225 mm

If there is other defects than described in this Tube Fault Descriptiono,
or defects exceed the limits given in this description, send the monitor to repairment.

8.2. Screen Defects

8.2.1. Phosphorus Dots

CATEGORY	**DEFINITION OF BLEMISHES**
Completely defective	50% or more of a dot is dark
Partially defective	25–49% of a dot is dark
Otherwise defective	Unstable brightness Blurs

TYPE OF FAULT		AMOUNT OF FAULTS	PERMISSIBLE AMOUNTS OF FAULTS ON THE PICTURE'S AREAS			MINIMUM DISTANCE/mm	
			A	B	A/B	A	B
A	A1	>=4 adjacent dots	0	0	0	50	50
	A2	3 adjacent dots (1–2 colours)	0	0	0	50	50
	A3	3 adjacent dots (3 colours)= trio	1	2	3	50	50
	A4	2 adjacent dots (1 or 2 colours)	2	2	3	50	50
B	1 dot	Green	4	3	8	–	–
	1 dot	Red	6	5	8	–	–
	1 dot	Blue	6	5	8	–	–
C	Total amount of dots		8		–	–	–

8.3. Glass Defects

8.3.1. Scratches

width/ mm	Length of scratch/ mm	Minimum distance/ mm
<=0.15	0	Not permitted
0.10<=W<0.15	13	50
0.05<=W<0.10	25	20
<0.05	No limits	Ignored

8.3.2. Other Defects in Glass

(Bubbles, measurable glass blemishes)

Size (S)/mm	Maximum amount on A– and B–area	Minimum distance/mm
0.6	0	Not permitted
0.4<=S<0.6	2	50
0.2<=S<0.4	3	50
Total amount	3	50
<0.2		

8.4. Coating Defects

DEFECTS	CONTENT OF DEFECT	ESTIMATING OF DEFECT
Brighr white points, lens, missing coating	Visible points/lens in green rasterpicture	size and amount

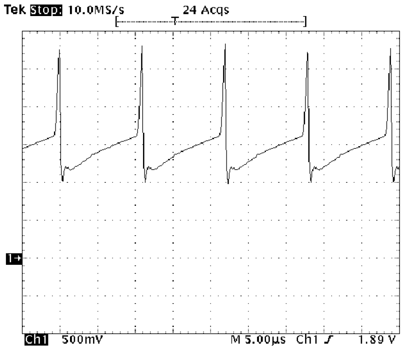
8.4.1. Coating Defects on A and B areas

Size (S)/mm	Total amount A– and B–area	Minimum distance/mm
>1.5	–	Not permitted
1.0<=S<=1.5	2	50
0.5<=S<=1.0	3	30

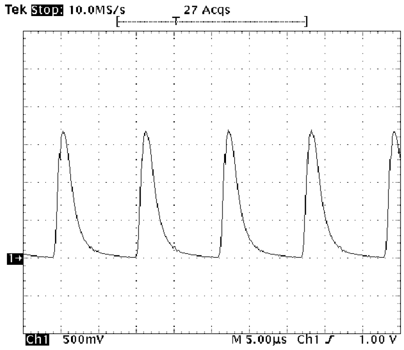
8.4.2. Scratches in Coating on A and B areas

Width (W)/mm	Length (L) of scratch/mm	Minimum distance/mm
>0.10	0	20
0.05<W<=0.10	38 (max 2 scratches)	20
<=0.05	No limits	20

1



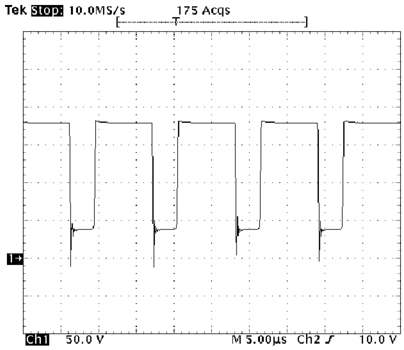
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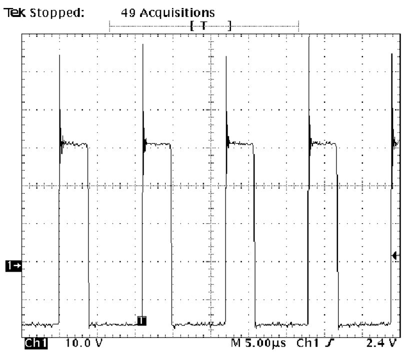
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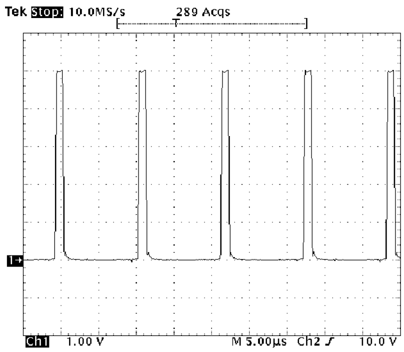
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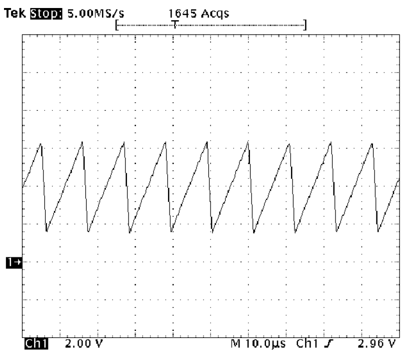
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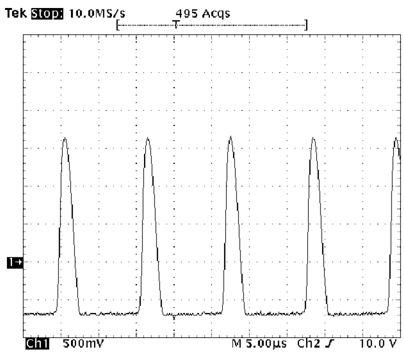
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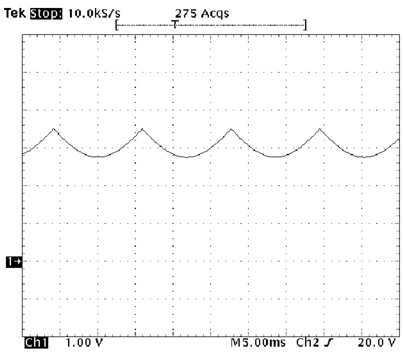
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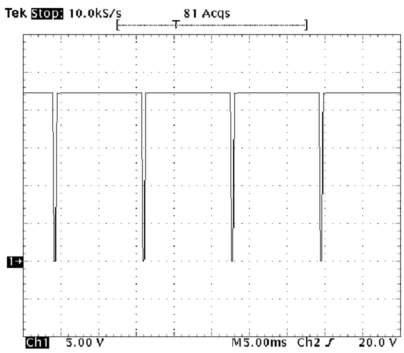
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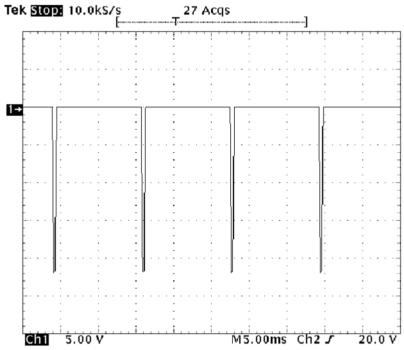
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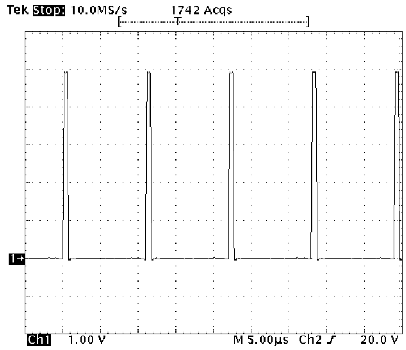
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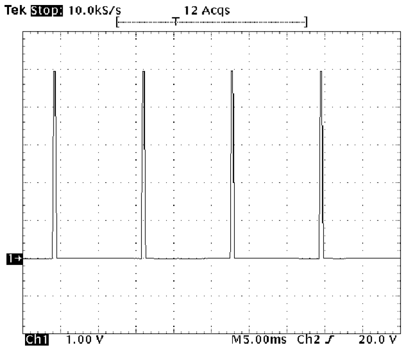
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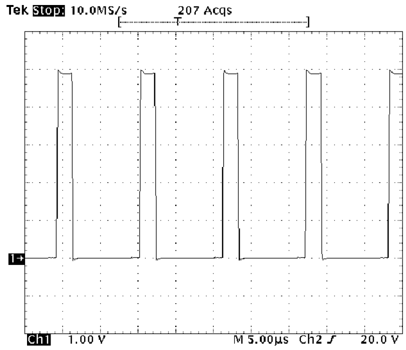
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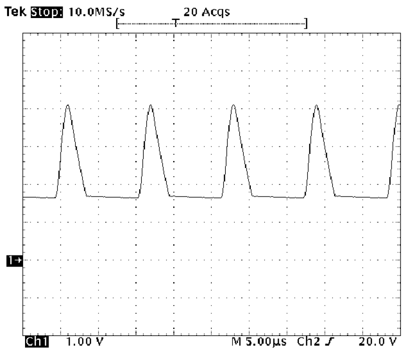
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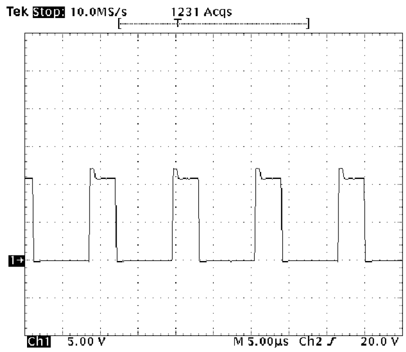
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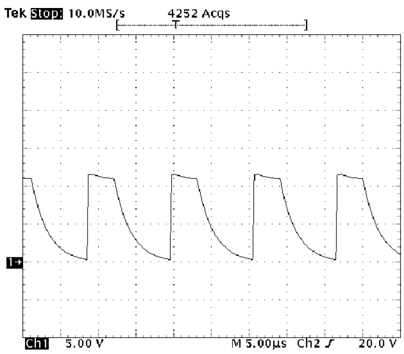
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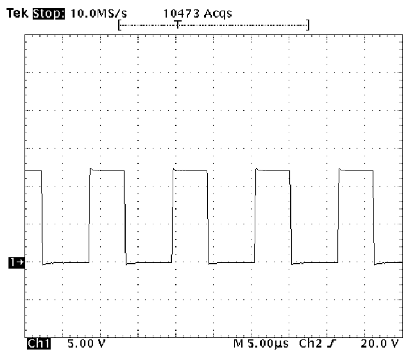
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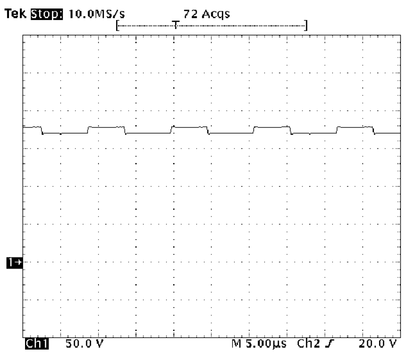
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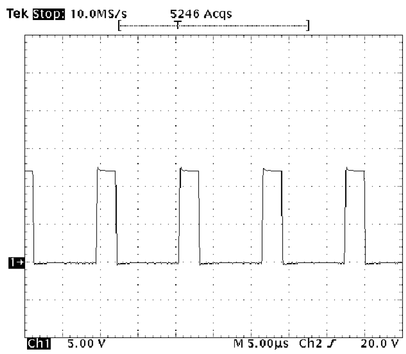
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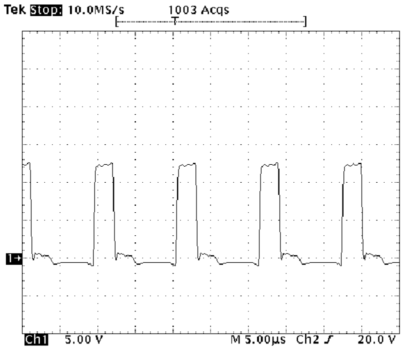
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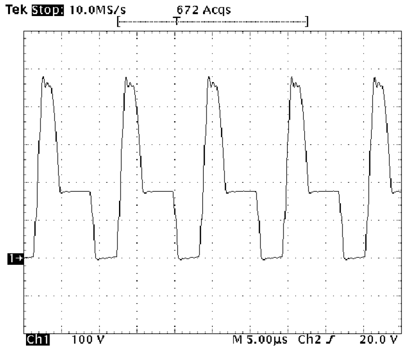
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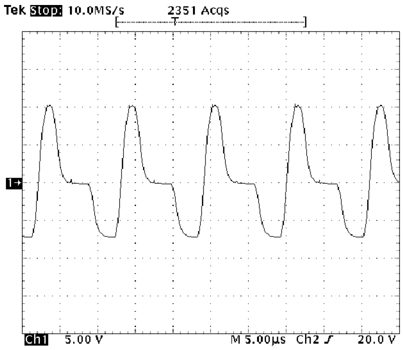
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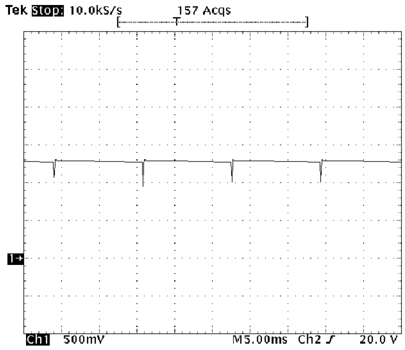
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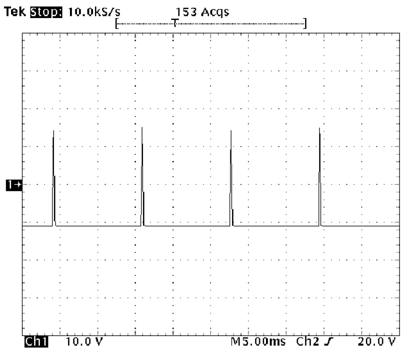
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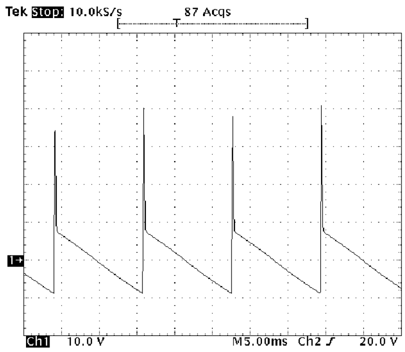
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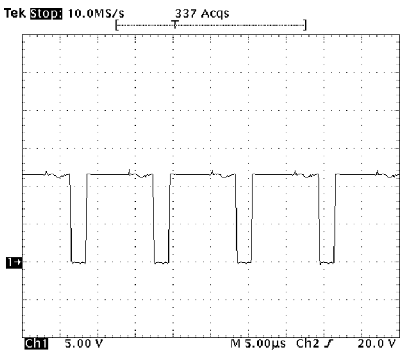
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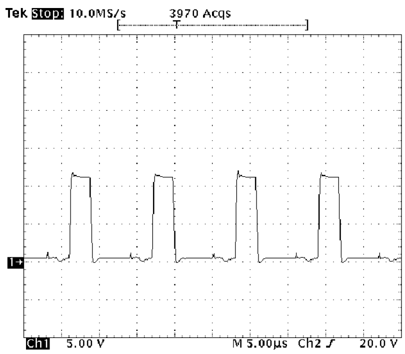
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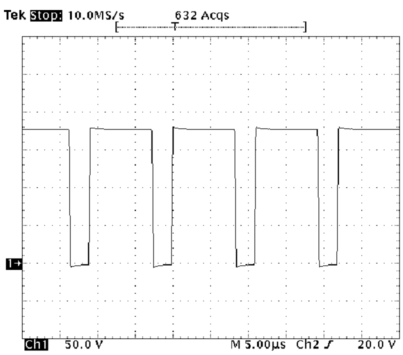
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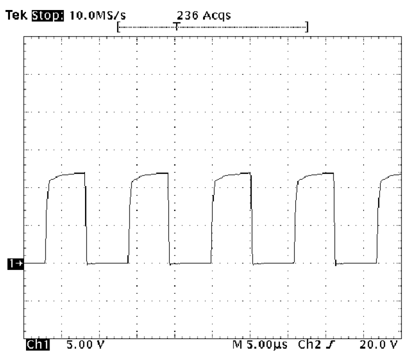
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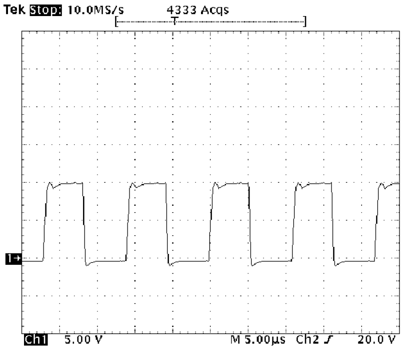
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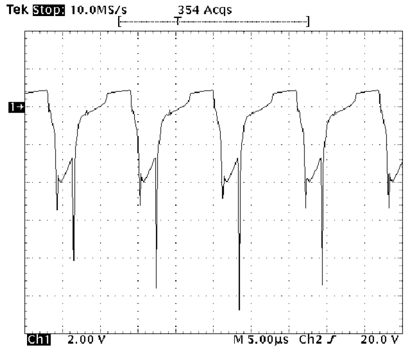
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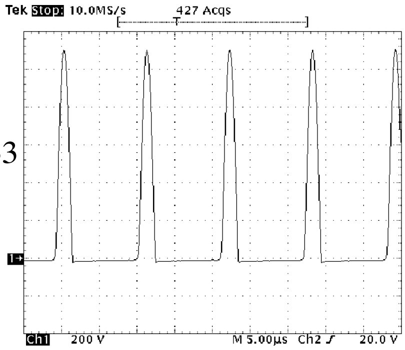
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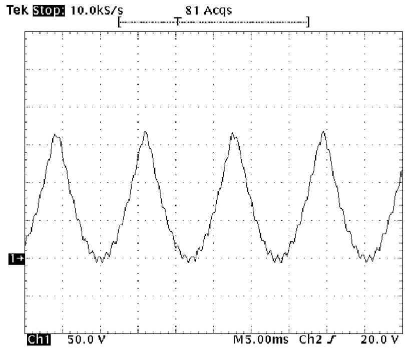
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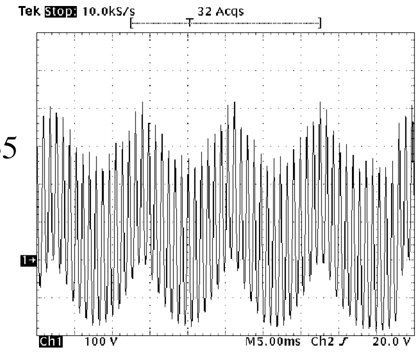
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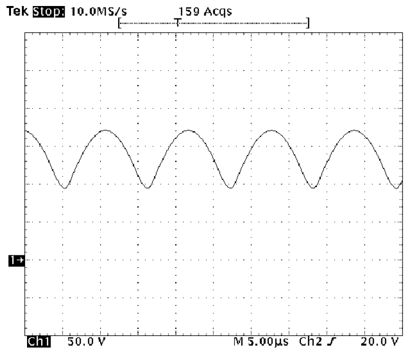
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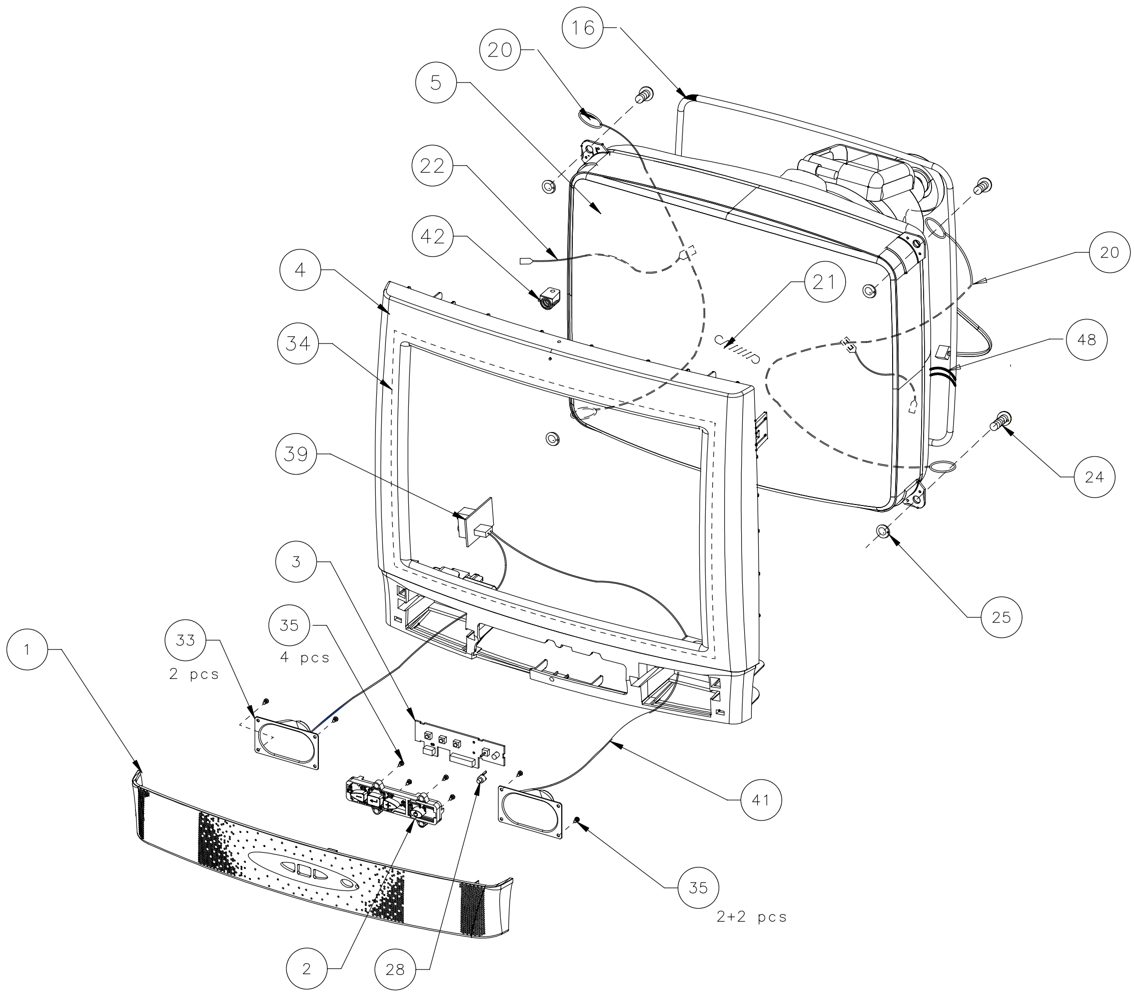


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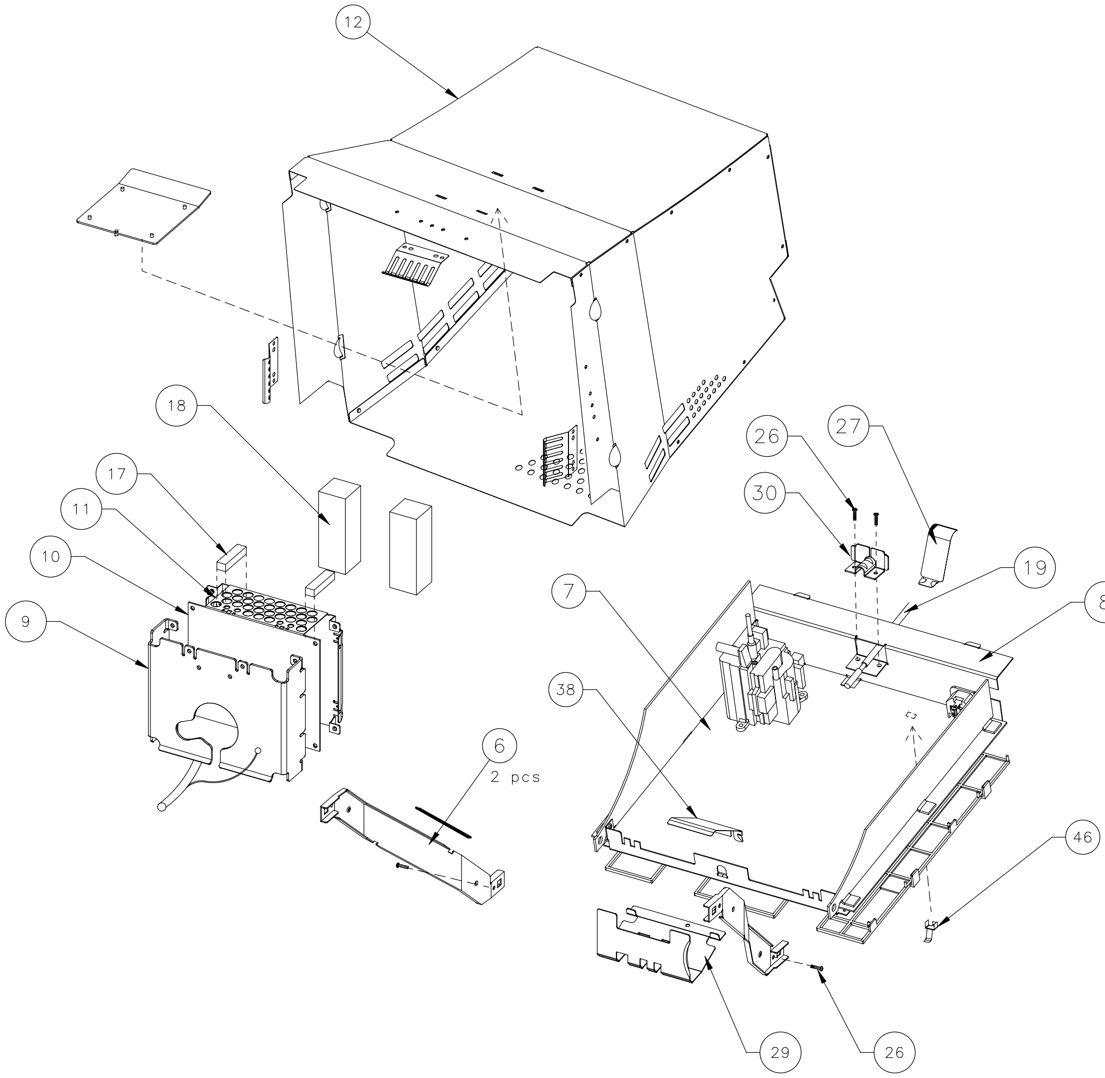


Spare Parts

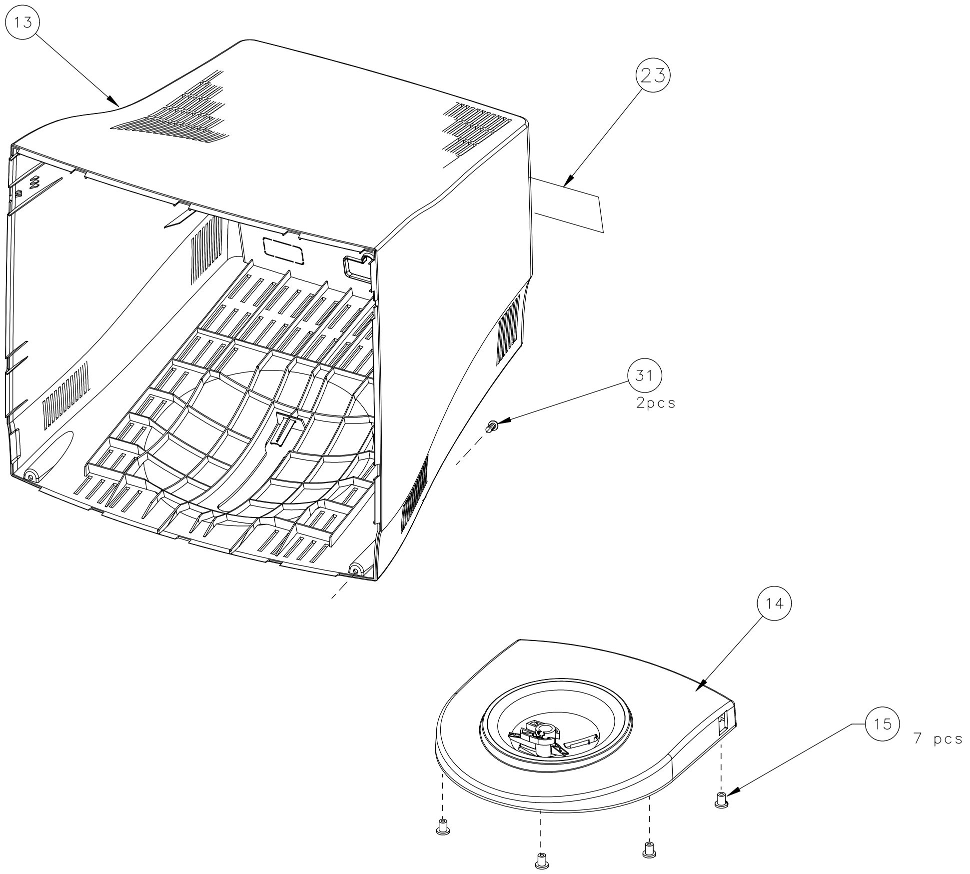
P/N	Production P/N	Description	Emis-sion
447ZAPlus	447O151	17” NOKIA FST 86kHz AUDIO VIS16 EU	
447ZAPlus	447O159	17” NOKIA FST 86kHz AUDIO VIS16 US	
447ZAPlus	447O351	17” NOKIA FST 86kHz A, USB VIS16 EU	
447ZAPlus	447O359	17” NOKIA FST 86kHz A, USB VIS16 US	



Item no	Description	Code	PG	447O
01	Panel (audio) blanc	UA7740A	17	
02	Keypad	UT1870	4	
03	Keyboard	SMZ080		
04	Front cover (audio)	UM8090A	26	
05	Picture tube 17” Philips FST	NM1052	61	
16	Demagn. coil	FD1700	21	
20	Ground wire	SE2753	5	
21	Grounding spring	UC3016	2	
22	Ground wire	SE2775	3	
24	Pt−screw K50x20	WCO537	2	
25	Friction plate	ULO131	1	
28	Light pipe	UA5704	3	
33	Loudspeaker 2W	QP0231	14	
34	TCO−wire	SE2772	4	
35	Pt−screw 1441 Zn Pz 30x8	WC0540	1	
39	PCB audio connector	SME004		
42	Microphone tube	UG1033	3	
48	Demagn.coil holder	UG1054	4	

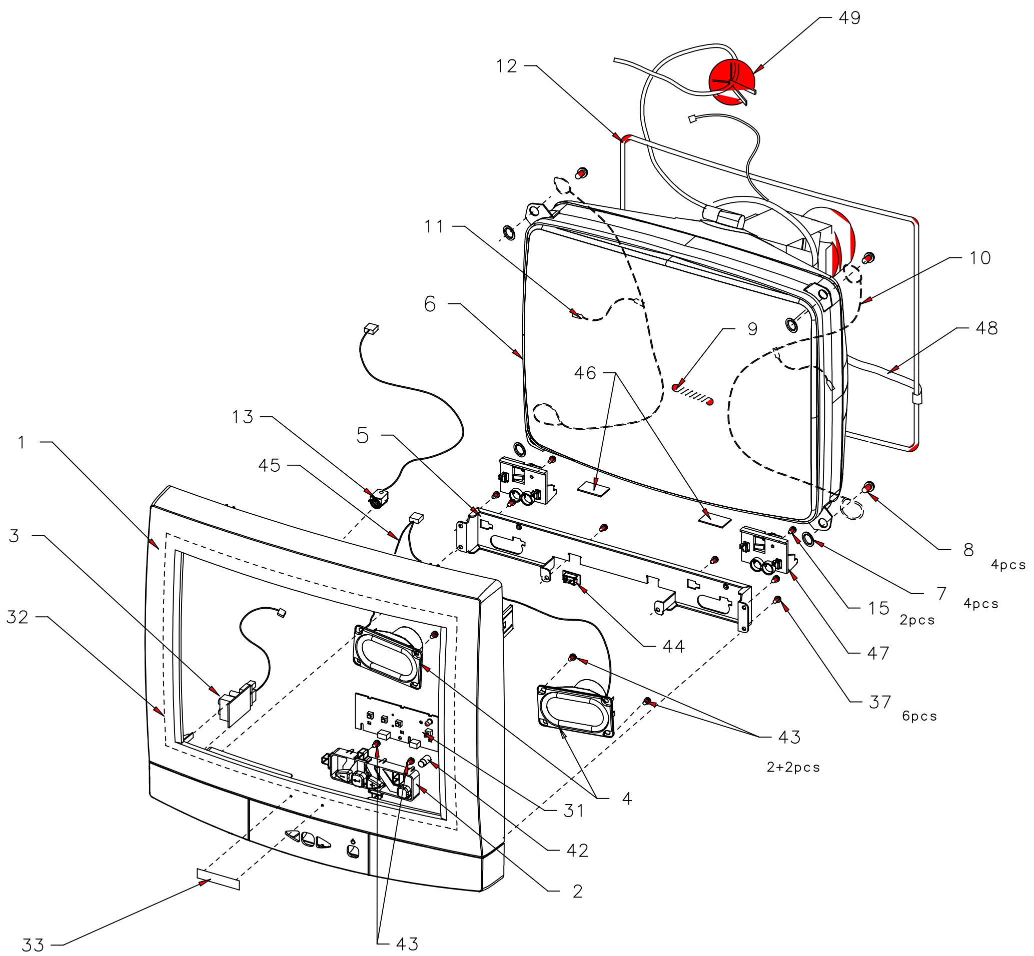


Item no	Description	Code	PG	447O
6	Side support	UC7052	6	
7	Main board	SMA231		
8	Connector panel	UC7042	22	
9	Bottom (video)	UC6985	6	
10	VideoPCB	SMH156		
11	Cover	UC6984	10	
12	Plate cover assembly	UC7051	27	
17	Cushion support	UA1319	1	
18	Cushion support	UA1318	3	
19	Signal cabel	QM0311	20	
26	Hexagon torx 10 tapping screw 3.5x9.5 Zn	WC0036	1	
27	Spring	UC6946	2	
29	Back cover support	UC7073	16	
30	Strainreliefer	UC7015	3	
38	Spring	UC7063	3	
46	Grounding spring	UC7109	2	

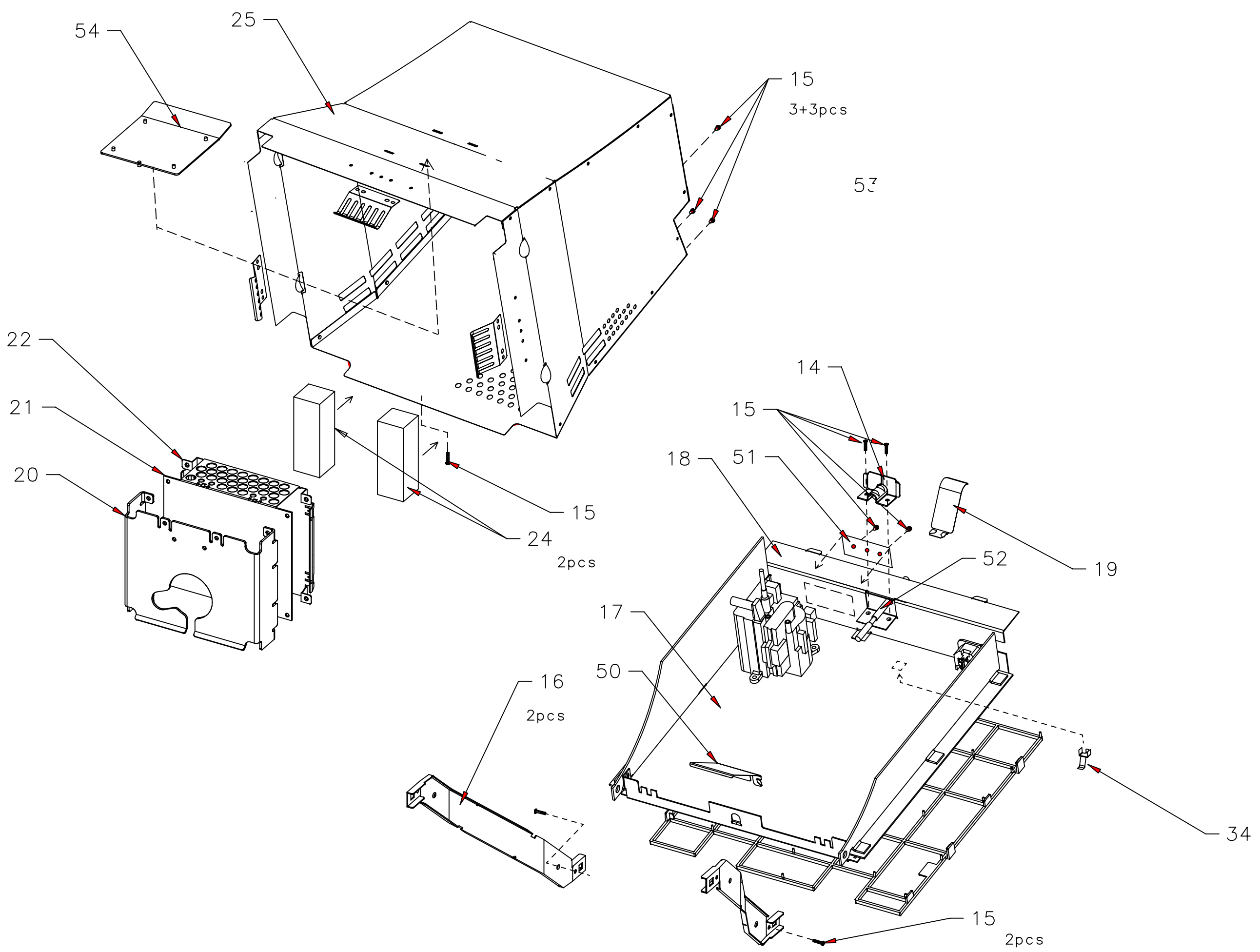


Item no	Description	Code	PG	447O
13	Back cover	UD0675	28	
14	Stand without USB	US0108	19	
15	Foot pad	UL0702	2	
23	Type label	ZZ2872	7	
31	PT−screw KB40x20 WN1447	WC0354	1	
43	USB−box	UC7075	18	
44	USB−insulator	UG1062	4	
45	USB−box cover	UC7074	16	
47	Screw TR1443 Zn Pz 3x16	WC0541	1	

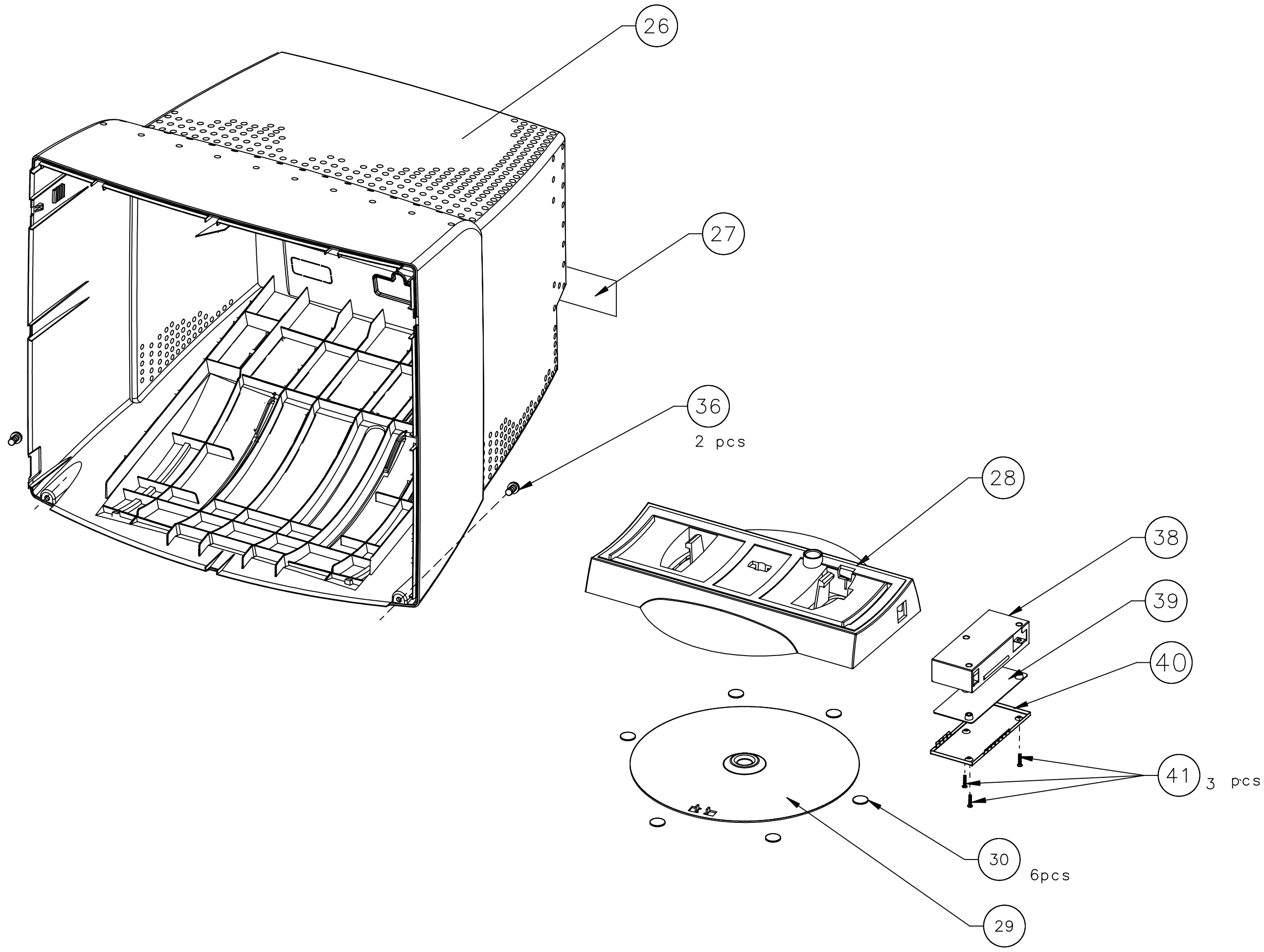
Packing materials:				**447O**
	Packing box	ZA2551	12	
	Side cushion Including Left and Right	ZA5009	5	
Cabels:				
	Power Cord 3x18AWG L=1,8M	QM0049	18	
	Plastic bag 230x320	ZA0453	2	
	Installation guide 447O/447ZA	ZF5822	3	
	Users guide CD Nokia 447ZAPlus	ZK0024	11	
	Audio cable 3.5mm to 2xRCA	QMO150	13	
	Warranty Card	ZA5812	2	
	Microphone cable 3.5mm to 3.5mm	QM0151	12	



Item no	Description	Code	PG	447O
01	Front cover	UM8110A	22	
02	Keypad	UT1874	4	
03	PCB audio connector	SME004		
04	Loudspeaker	QPO233	15	
05	Chassis support	UC7110	7	
06	Picture tube	NM1052	61	
07	Friction plate	ULO131	1	
08	Pt−screw K50x35	WCO537	2	
09	Spring	UC3016	2	
10	Ground wire	SE2753	5	
11	Ground wire	SE2691	3	
12	Demagn coil	FD1700	21	
13	Microphone tube	UG1033	3	
31	Control module	SMZ086		
32	TCO wire	SE2772	4	
33	Badge NOKIA	UA1243	8	
37	Pt−screw K40x14	WCO353	1	

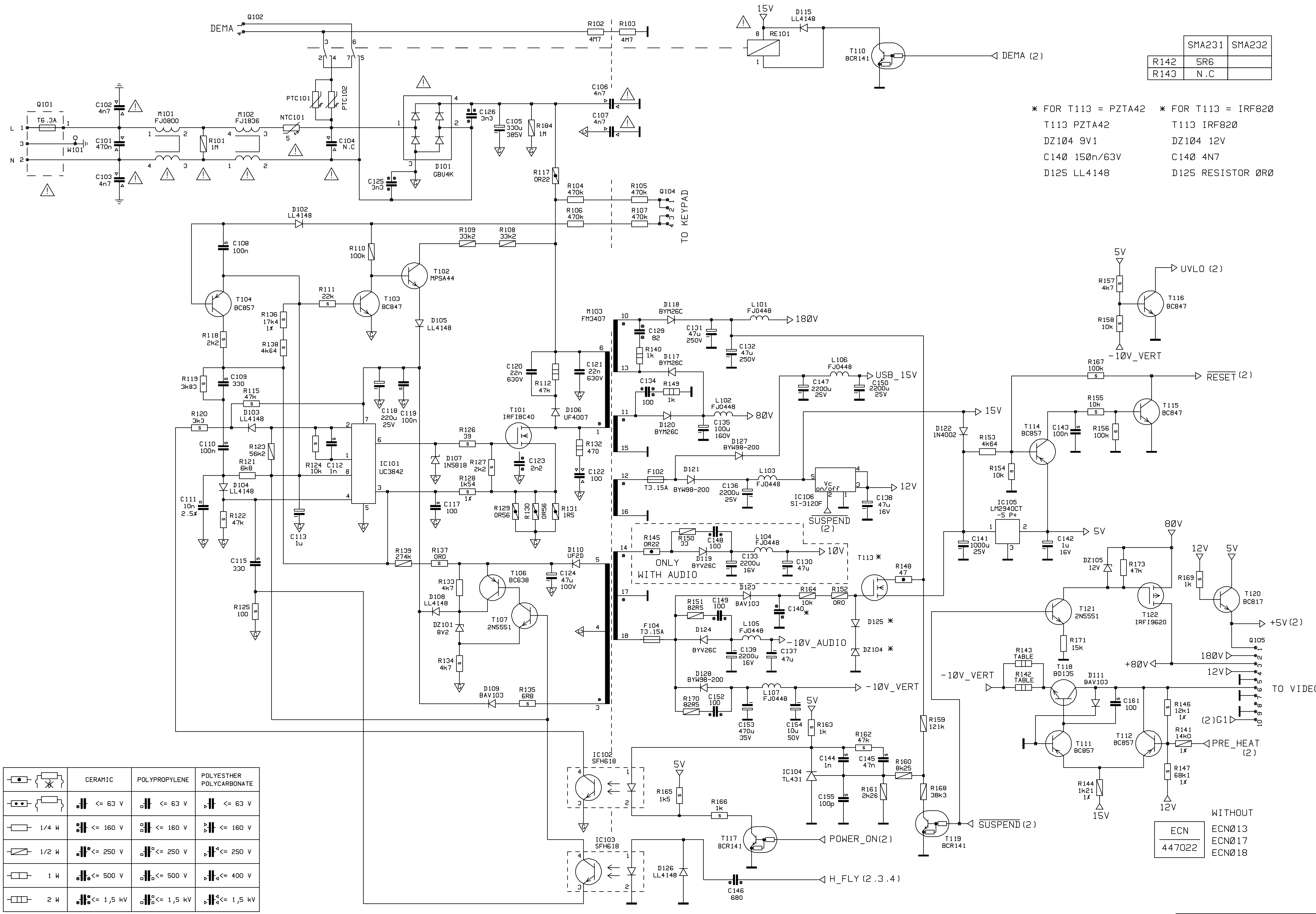


Item no	Description	Code	PG	447O
14	Strainreliefer	UC7015	3	
15	Screw	WCO036	1	
16	Side support	UC7052	6	
17	Main board	SMA247		
18	Connector panel	UC7042	22	
19	Spring	UC6946	2	
20	Bottom (video)	UC6984	10	
21	Video PCB	SMH156		
22	Cover (video)	UC6985	6	
24	Cushion support	UA1318	3	
25	Plate cover assembly	UC7051	27	
34	Grounding spring	UC7109	2	



Item no	Description	Code	PG	447O
26	Back cover	UDO656	27	
27	Type label	ZZ2855	6	
28	Bottom cover	USO127	15	
29	Bottom plate (stand)	UC7010A	10	
30	Foot pad	ULO135	2	
36	Pt−screw K40x20 WN1447	WCO354	1	
38	USB−box	UC7075	18	
39	USB−insulator	UG1062	4	
40	USB−box cover	UC7074	16	
41	Screw TR 1443 Zn Pz	WC0541	1	

Packing materials:				**447O**
	Side cushion Including Left and Right	ZA5009	5	
	Packing box	ZA2551	5	
Accessory kit:				
	Users guide CD NOK 447O/447Z	ZK0024	11	
	Installation guide 447O/447ZA	ZF5822	03	
	Plasticbag 230x320	ZA0453	2	
	Power Cord 3x1.8AWG L=1,8, 8m RAL7032	QM0028	14	
	Audio cable 3.5mm to 2xRCA	QMO150	13	
	Microphone cable 3.5mm to 3.5mm	QMO151	12	



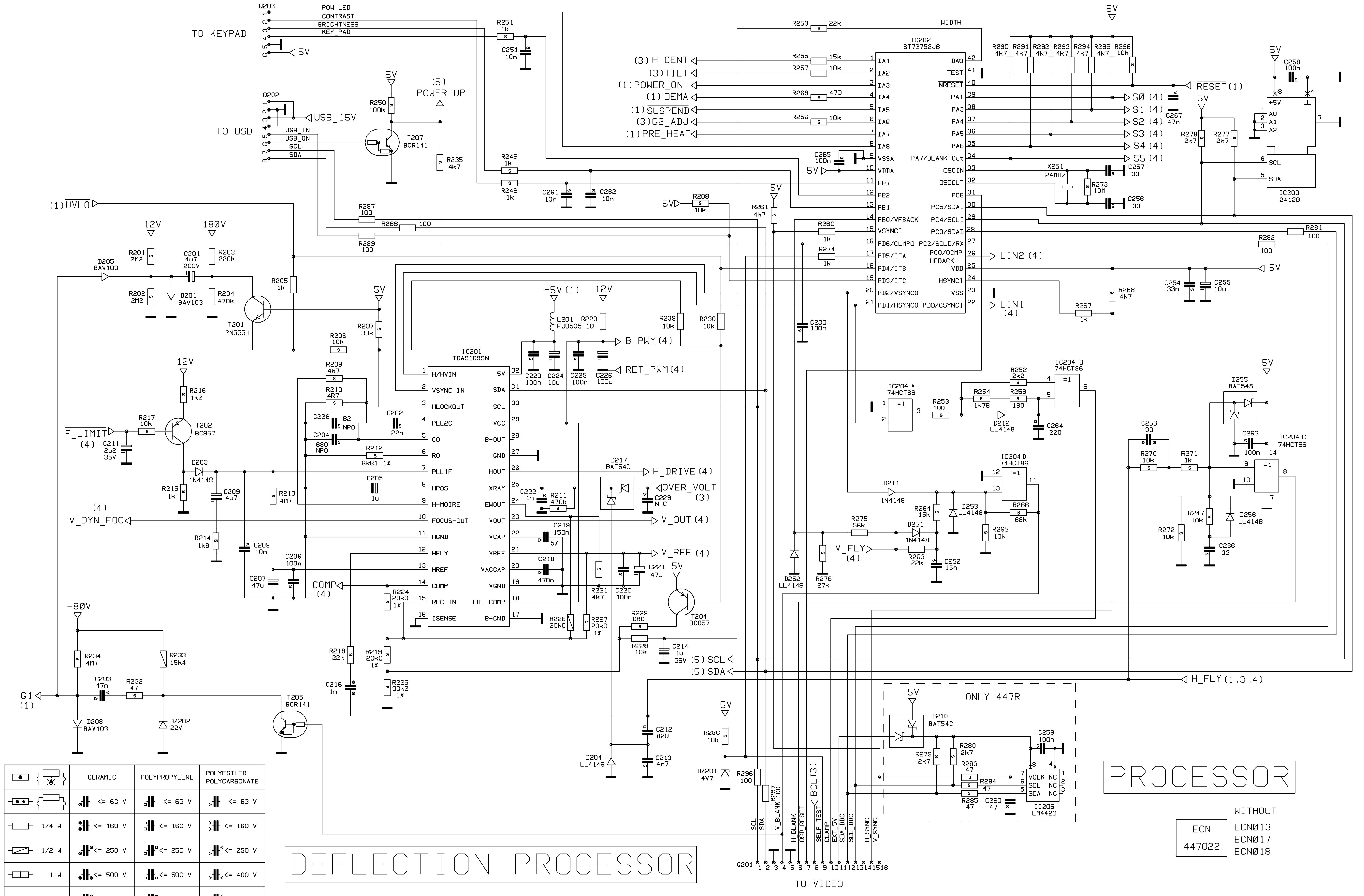
	SMA231	SMA232
R142	5R6	
R143	N.C	

* FOR T113 = PZTA42	* FOR T113 = IRF820
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DZ104 9V1	DZ104 12V
C140 150n/63V	C140 4N7
D125 LL4148	D125 RESISTOR 0R0

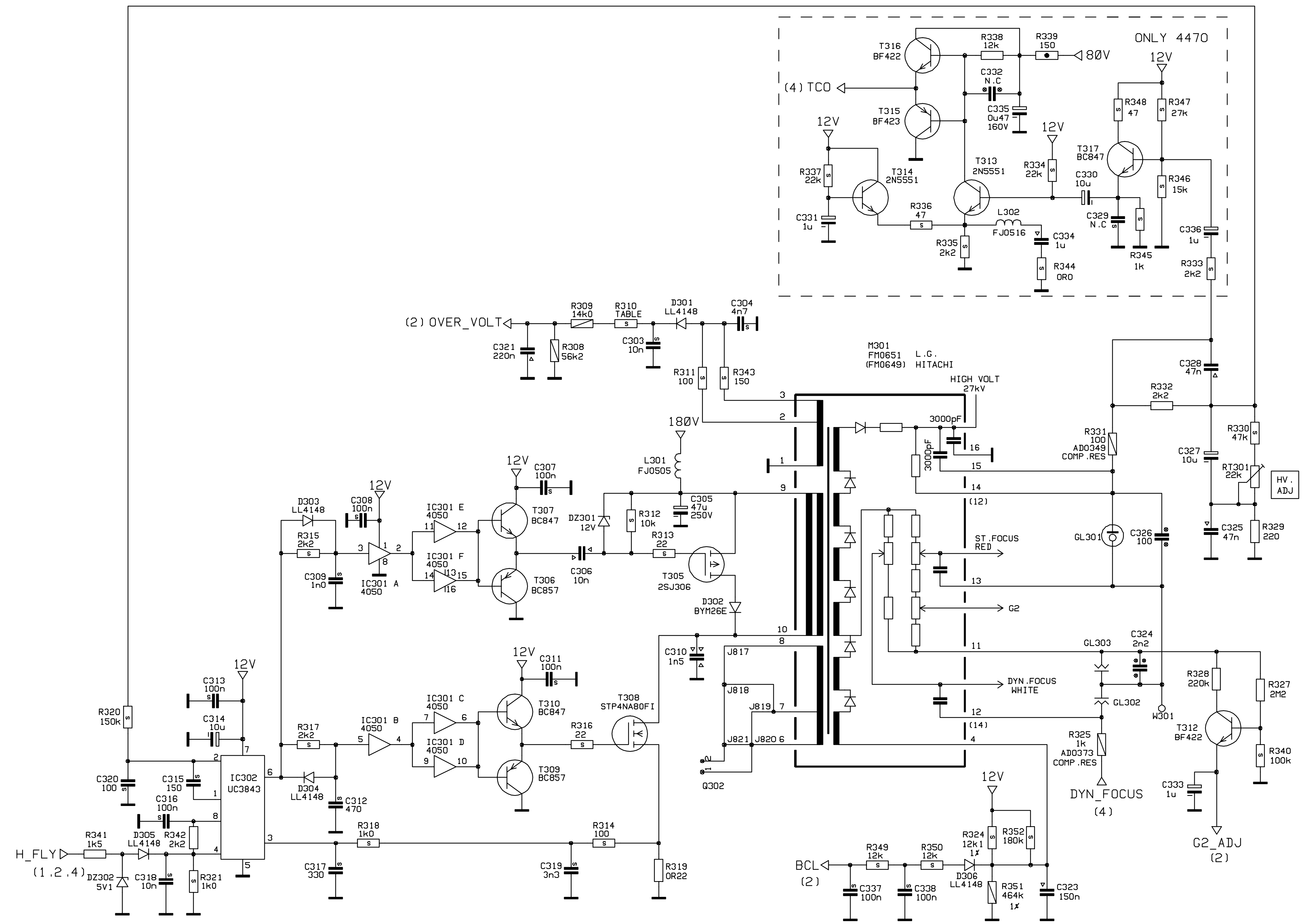
	CERAMIC	POLYPROPYLENE	POLYESTHER POLYCARBONATE
	<= 63 V	<= 63 V	<= 63 V
1/4 W	<= 160 V	<= 160 V	<= 160 V
1/2 W	<= 250 V	<= 250 V	<= 250 V
1 W	<= 500 V	<= 500 V	<= 400 V
2 W	<= 1,5 kV	<= 1,5 kV	<= 1,5 kV

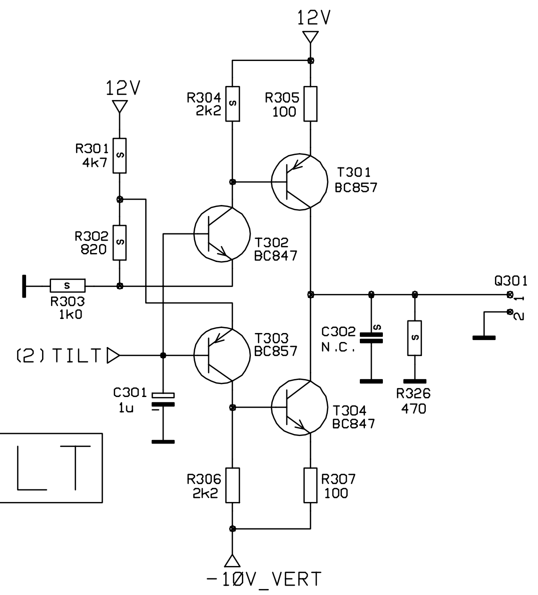
ECN
447022

WITHOUT
ECN013
ECN017
ECN018



	CERAMIC	POLYPROPYLENE	POLYESTHER POLYCARBONATE
	<= 63 V	<= 63 V	<= 63 V
1/4 W	<= 160 V	<= 160 V	<= 160 V
1/2 W	<= 250 V	<= 250 V	<= 250 V
1 W	<= 500 V	<= 500 V	<= 400 V
2 W	<= 1,5 kV	<= 1,5 kV	<= 1,5 kV





TILT

JUMPER ALTERNATIVES

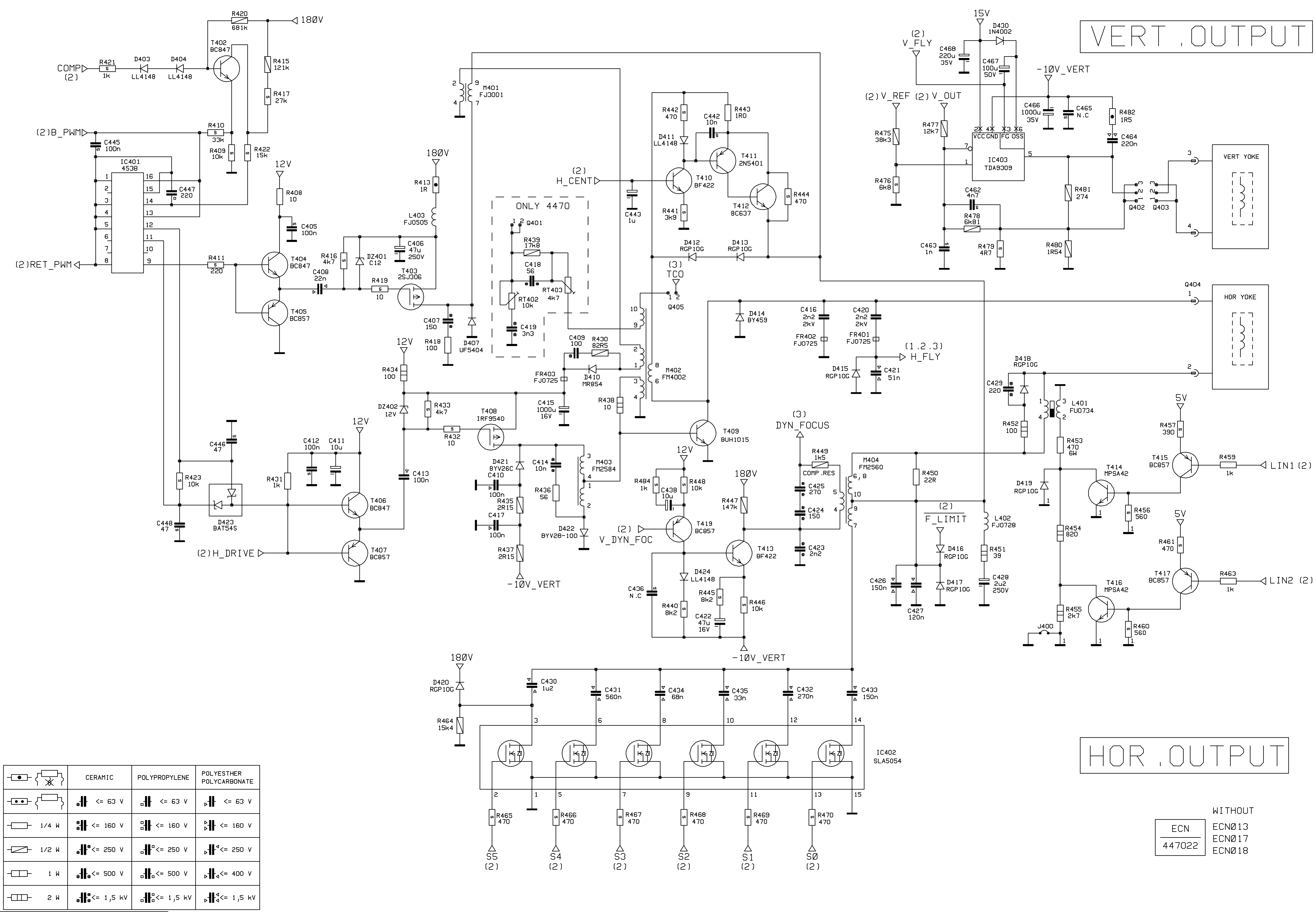
	FM0649	FM0651
J817	C.	N.C.
J818	N.C.	N.C.
J819	N.C.	N.C.
J820	C.	N.C.
J821	N.C.	C.
R310	1k	4k7

	CERAMIC	POLYPROPYLENE	POLYESTHER POLYCARBONATE
	<= 63 V	<= 63 V	<= 63 V
1/4 W	<= 160 V	<= 160 V	<= 160 V
1/2 W	<= 250 V	<= 250 V	<= 250 V
1 W	<= 500 V	<= 500 V	<= 400 V
2 W	<= 1,5 kV	<= 1,5 kV	<= 1,5 kV

HV GENERATOR

ECN
447022

WITHOUT
ECN013
ECN017
ECN018

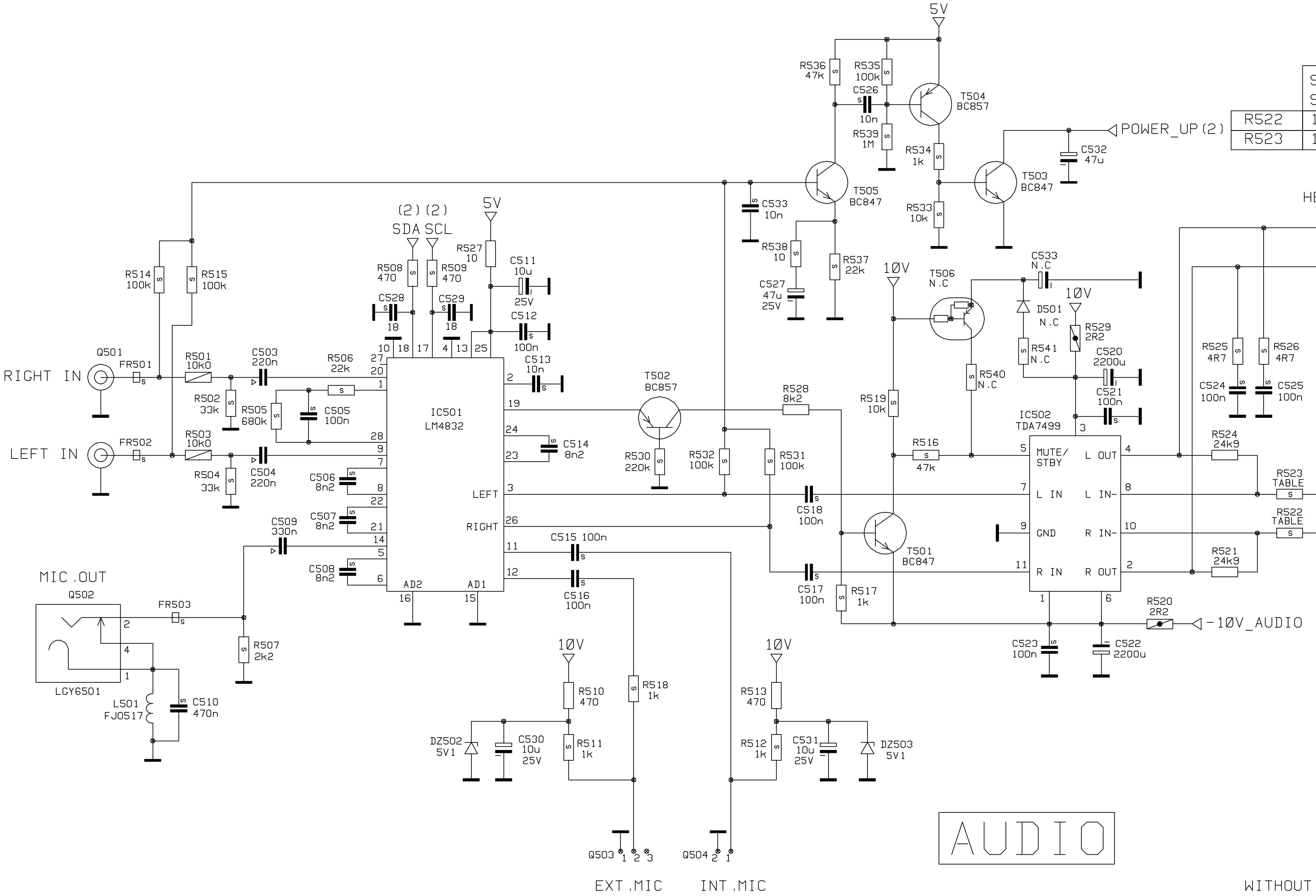


ECN
447022

WITHOUT
ECN013
ECN017
ECN018

SMA231 1

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	SMA231 SMA232	SMA247 SMA248
R522	11KØ	6K81
R523	11KØ	6K81

ECN
447022

WITHOUT
ECNØ13
ECNØ17
ECNØ18

Part NO	Description	PG	Item Number		
SH1853	KONELAD.SMA247 SB5241				
AA0713	CF RES 0W25 47K J 2,5-7	1	TA	113	
AJ2523	MO RES 2W0 10R J 6-17	2	RA	438	
AJ2603	MO RES 2W0 22R J 6-17	2	RA	143 142	SMA247B
AJ2663	MO RES 2W0 39R J 6-17	2	ra	451	
AJ2763	MO RES 2W0 100R J 6-17	2	RA	434 452	
AJ2923	MO RES 2W0 470R J 6-17	2	RA	132	
AJ2927	MO RES 6W0 470R J 9-33	4	RA	453	
AJ2983	MO RES 2W0 820R J 6-17	2	RA	454	
AJ3003	MO RES 2W0 1K0 J 6-17	2	RA	149 140	
AJ3103	MO RES 2W0 2K7 J 6-17	2	RA	455	
AJ3403	MO RES 2W0 47K J 6-17	2	RA	112	
AQ2218	TPMET.AA H10 22K RM 5X10 6-H	3	RTA	301	
AQ2745	TPMET.AA V10 10K RM5X2,5 6-HO	1	RTA	402	
AQ2740	TPMET.AA V10 4K7 RM5X2,5 6-HO	3	RTA	403	
AW0079	PTC-THERMISTOR 18R/25'C RM5	7	PTCA	101 102	
AW0111	NTC-THERMISTOR 5R0/25'C RM5+	7	NTCA	101	
CA0322	CERCAP Y5P 2N2 K 1KV Y5: D	2	CA	324	
CB0473	CERCAP SL 33P J 500V Y5: D	1	CA	253	
CC0200	CERCAP Y5P 1N0 K 500V Y5: D	1	CA	216	
CC0513	CERCAP Y5V 3N3 S 1KV Y7,5 D	2	CA	125 126	
CC0551	CERCAP Z5U 10N S 500V Y7,5	1	CA	414	
CE0085	X2-CAP 470N M 275VAC Y22.5 PLA	7	CA	101	
CE0126	Y-CAP 4N7 M 400VAC Y12,5 SDP	4	CA	102 103 106 107	
CE2004	IMPCAP 100P K 1K6V Y15 051	3	CA	122	
CE2154	IMPCAP 1N5 K 1K5V Y22,5 071	4	CA	310	
CE2195	IMPCAP 2N2 H 2KV Y22.5 071727	5	ca	420	
CE2196	IMPCAP 2N2 J 2KV Y22,5 081	4	CA	416	
CE2671	IMPCAP 33N J 400V Y15 061	4	CA	435	
CE2802	IMPCAP 51N J 400V Y15 081	3	CA	421	
CE2852	IMPCAP 68N J 400V Y15 081	4	CA	434	
CE2940	IMPCAP 120N J 400V Y22,5 091	6	CA	427	
CE2974	IMPCAP 150N K 400V Y22,5 091	7	CA	433 426	
CE3043	IMPCAP 270N J 400V Y22.5	1	CA	432	
CE3133	IMPCAP 560N J 250V Y22,5 112	8	CA	431	
CE3224	IMPCAP 1U2 J 250V Y22,5 112	6	CA	430	
CE3292	IMCAP 2U2 J 250V Y27.5 142	12	ca	428	
CK0163	PESCAP MKT 22N K 250V Y10 051	2	CA	408	
CK0165	PESCAP MKT 22N K 630V Y10 061	2	CA	120 121	
CK0221	PESCAP MKT 47N J 250V Y10 051	2	CA	203	
CK0341	PESCAP MKT 220N K 100V Y10 051	3	CA	464	
CK1388	PESCAP MKT 10N K 250V Y7,5 040	2	CA	306	
CK2784	PESCAP MKT 470N K 63V Y5: 051	3	CA	218	
CK2744	PESCAP MKT 330N K 63V Y5: 051	3	CA	509	
CK2864	PESCAP MKT 1U0 K 50V Y5:0611	5	CA	334	
CN0095	ELCAP 330U M 385V RM10 30 X 45	19	CA	105	
CN2232	ELCAP' 4U7 M 200V RM5 105'10	4	CA	201	
CN2461	ELCAP- 47U M 100V RM5 105, 10	4	CA	124	
CN2476	ELCAP 47U M 250V RM7,5 105'17X	5	CA	131 132 406	
CN2546	ELCAP 100UF M 100V RM5 105' 14	5	CA	135	
CN0727	ELCAP 1000U M 25V RM5 14	4	CA	141	
CN2712	ELCAP 1000U M 16V RM5: 105'11X	5	CA	415 466	
CN2749	ELCAP 2200U M 16V RM5 105 14X	4	CA	139 133 520 522	
CN3427	ELCAP,2200U M 25V RM7,5 105'16	6	CA	136	
CN3251	ELCAP 47U M 250V RM7,5 105' 16	7	CA	305	
FJ0448	CHOKE 13UH FERRITE 2X15	2	LA	101 102 103 104 105 107	
FJ0724	CHOKE 470UH 10% 5 MM RADIAL	4	LA	402	
FJ0800	EMI/RFI CHOKE 60MH 3A(AC)	9	MA	101	
FJ1836	INPUT CHOKE LFZ2805V08 8MH 2A	8	MA	102	
FJ3001	DEFL.INPUT CHOKE E25/7	10	ma	401	
FM0651	FLYBACK TRAFO 30.120KH 2XHVC	30	ma	301	
FM2560	DYNAMIC FOCUS TRAFO E20/6 445	12	MA	404	
FM2584	DRIVER TRAFO EF16/E13 4	7	MA	403	
FM4002	CENTERING COIL E25/7 4	10	ma	402	
FM3407	SMPS-TRAFO ETD44 N27	17	MA	103	SMA231B
FM3410	*NEW* SMT ETD44 4	16	MA	103	SMA247B

Part NO	Description	PG	Item Number			
FU0734	FIXED LIN.COIL W/ADJ.COIL 4	13	LA	401		
JB0042	DI BY459X 1500V 10A 0,25/0,5US	13	DA	414		
JB0100	DI GBU4K BRIDGE 800V 4A	8	DA	101		
JF0033	DI UF5404 400V 3A 50NS DO20	4	DA	407		
JF0145	DI BYM26E 1000V 2.3A 75NS	7	DA	302		
JF0090	DI MR854 400V 3A 200N	4	DA	410		
JF0096	DI BYV28-100 100V 3.5A 30N	4	DA	422		
JF0166	DIODE BYM26C 600V 2.3A SOD-64	6	DA	118 117		
JF0168	DIODE BYW98-200 200V 3A DO-27	4	DA	121 128		
JL0069	OPTOCOUPLER VRMS 5KV	4	ICA	102 103		
JM0334	TR BD135 NPN 45V 1A5 250MHZ TO	4	TA	118		
JM0340	TR BUH1015 N 1500V 14A ISOWATT	15	TA	409		
JS0078	FET STP7NB60FP N 600V 3.5A 1R2	9	TA	101		
JS0051	FET IRF9540 P 100V 19A 0.2R TO	7	TA	408		
JS0049	FET 2SJ306 P 250V 3A 1.5R TO2	15	TA	403		
JS0049	FET 2SJ306 P 250V 3A 1.5R TO2	15	TA	305		
JS0058	FET IRF9620 P 200V 1R5 3A TO22	7	TA	122		
JS0079	FET STP4NB80FP N 800V 2,1A 3R0	10	TA	308		
JS2002	FETARRAY SLA5054 6X150V 5A, 7A	19	ICA	402		
JZ0020	SILICONE INSUL. 13X19MM	1	TA	408 109		
JZ0022	SILICONE INSUL. 22X30MM	3	ICA	502		
JZ0023	SILICONE INSUL. 10X13MM	1	TA	118		
JZ0020	SILICONE INSUL. 13X19MM	1	ICA	403		
LM0603	IC LM2940CT LOW DROP REG.5V TO	8	ICA	105		
LM0763	IC UC3842 CURRENT MODE PWM CON	8	ICA	101		
LM0942	IC TL431 VOLTAGE REFERENCE TO-	4	ICA	104		
LM0956	IC TDA9309 VERT.DEFL.BOOSTER H	8	ICA	403		
LM0957	IC UC3843 CURR.MODE PWM CON.DI	6	ICA	302		
LM0967	IC SI-3120FA 12V LOWDROP REG 2	9	ICA	106		
LM0974	IC LM4832N BOOMER DI	18	ICA	501		
LM0981	IC M24128 EEPROM 128K (16X8) D	13	ICA	203		
LM0996	IC TDA7499 AUDIO AMP.2X6W M&ST	12	ICA	502		
LM1006	IC TDA9109/SN DEFL.PROC. SDIP3	17	ICA	201		
LM1007	IC ST72T752J6B1 MCU 32ROM SDI	25	ICA	202	V.0.28	
LZ0077	IC-SOCKET 42-POLE DUAL LEAF 1.	6	ICA	202		
QA0098	CRYSTAL 24.000MHZ FUNDAM. HC-4	6	XA	251		
QH0065	RELAY PCB-MOUNTING 12V 5A/250V	12	REA	101		
QK1284	ROW CONN 1X02 7,62 VERT/LOCK	2	QA	102		
QK1287	PIN STRIP 1X04 8,0/10.0 VERT M	3	QA	404		
QK1587	COOLING & SUPP.PART FOR RESIST	1	RA	453 454		
QK1632	ROW CONN 1X02 2,5 V STGLOCK S	2	QA	504		
QK1633	ROW CONN 1X03 2,5 V STGLOCK SN	2	QA	503		
QK1694	RCA JACK UNIT 2X6.3MM R/W PCB9	6	QA	501		
QK0851	TAP CONN RTM 1,3/5/8.002	8	QA	401		
QK1701	PICOFLEX HEADER 1X04 1,27MM	3	QA	104 505		
QK1702	PICOFLEX HEADER 1X06 1,27MM	3	QA	203		
QK1463	ROW CONN "JST" 1X02 2,5 VERT	2	QA	301		
QK1712	PIN JACK 3,6MM MONO H=6,5MM	3	QA	502		
QK1754	FUSEFIT AC INLET FOR PCB VERT.	7	QA	101		
QM1013	PICOFLEX ASSY BI-IDC 10-POS 40	8	QA	105		
QM1019	PICOFLEX ASSY BI-IDC 16-POS 42	11	QA	201		
QM1059	PICOFLEX ASSY IDC-ICD 4POS 350	5	QA	104		SMA231B
QM1060	PICOFLEX ASSY IDC-ICD 6POS 200	6	QA	203		SMA231B
QT0002	SPARK GAP 1,2KV +-500V R=5,0MM	3	GLA	302 303		
QT0207	GLIMM LAMP 95V 6*12,5MM	4	GLA	301		
QT0733	FUSE R=5,0MM T 3,15A 250V IEC	4	FA	102 104		
QT0775	FUSE 5*20MM T 6,3A 250V 1500A	3	QA	101		
SE2761	MICROPHONE CABLE 447R L=700	14				
SE2766	EXT MIC WIRE 447R AUDIO	11	QA	503		
SE2687	FLAT CABLE VERTICALE 3-POLE 4	3	QA	402 403		
SE2783	GROUNDING WIRE 445Z	3				
SE2787	GROUNDING CABLE 447O					
SE2747	GROUNDING WIRE 446B/447U	4				
SE2679	GROUNDING WIRE 447S	3	WA	301		
UC0859	SPRING DN44	2	TA	305 308 408 403 109		
			ICA	105 106		
UC1140	COOLING PLATE DN CU	2	TA	305 308 408 118 109		

Part NO	Description	PG	Item Number	
			ICA	105 106
UC6837	COOLING PLATE	8	TA	403
UC6551	SPRING DN 49256	3	TA	101
			ICA	403
			DA	414
UC6552	FASTSPRING DN 49257	3	TA	409
			ICA	502
UC6668	FASTSRING TO126	2	TA	118
UC7063	GROUNDING SPRING 447R	3		
UC6946	MAAD.JOUSI/GROUNDING SPRING 44	2		
UC6862	KIINNITYSJOUSI/FAST.SPRING 447	2	ICA	402
			DA	101
UC6995	COOLING PLATE 447Y	15	TA	101
UC7040	COOLING PLATE 447R	15		TA409/ICA402,502/DA414
UC7041	COOLING PLATE 447R	13	ICA	403
UC7109	GROUNDING SPRING 447R	2	EA	101
UC6752	ALUSLEVY 447E	1		
UC7042	CONNECTOR PANEL 447R	7		
UC7043	SUPPORT 447R	16		
UC7144	COOLING PLATE 447R	12	DA	101
UCX012	DIODE/COOLING PLATE ASSEMBLY J	5	DA	120
UJ0125	TIES/JOHTOSIDOKE SST 1 M	1		
UG0770	JOHTOPIDIKE SIS. MITAT 11X20MM	3		
UG0814	INSULATOR PN30084 447K	1		
UG1069	HOLKKI/SLEEVE DN40329 22.4 GRE			
XW0032	DC340 HEAT SINK,DOW CORNING		ICA106 105	TA118 305 308 408 403 409 101/DA414
WC0036	KUUS.KAN.LEVYR.UNI6950 SCREW	1		
WC0446	KUUS.KANT.-TYLPPÄ 2,9X8 FE/ZN	1		
WC0530	SCREW 2,9X10 YELLOW FE/ZN	1	MA	301
WC0542	PT-SCREW K40X35 WN1447 TORX10	2	MA	301
XW0260	SULATELIIMA JET-MELT 3796 TC	2		
SH1853	KONELAD.SMA247 SB5241			
SB5241	PCB 447O SMA231 FR2 1S 1P SB52			
AA0625	CF RES 0W25 10R J 2,5-7	1	RA	223 527 408
AA0633	CF RES 0W25 22R J 2,5-7	1	RA	450
AA0643	CF RES 0W25 56R J 2,5-7	1	RA	436
AA0649	CF RES 0W25 100R J 2,5-7	1	RA	305 307 418 281 282 296 297 513
AA0657	CF RES 0W25 220R J 2,5-7	1	RA	329
AA0673	CF RES 0W25 1K0 J 2,5-7	1	RA	274 260 267 431 205 463 459
AA0677	CF RES 0W25 1K5 J 2,5-7	1	RA	341
AA0681	CF RES 0W25 2K2 J 2,5-7	1	RA	306 342 332
AA0689	CF RES 0W25 4K7 J 2,5-7	1	RA	290 295 294 291 292 293
AA0695	CF RES 0W25 8K2 J 2,5-7	1	RA	528
AA0697	CF RES 0W25 10K J 2,5-7	1	RA	230 228 257 238 164
AA0699	CF RES 0W25 12K J 2,5-7	1	RA	338
AA0701	CF RES 0W25 15K J 2,5-7	1	RA	255 171
AA0705	CF RES 0W25 22K J 2,5-7	1	RA	263
AA0709	CF RES 0W25 33K J 2,5-7	1	ra	174
AA0713	CF RES 0W25 47K J 2,5-7	1	RA	173
AA0715	CF RES 0W25 56K J 2,5-7	1	RA	275
AA0721	CF RES 0W25 100K J 2,5-7	1	ra	176
AA0729	CF RES 0W25 220K J 2,5-7	1	RA	328
AA0737	CF RES 0W25 470K J 2,5-7	1	RA	104 105 106 107 203
AA0745	CF RES 0W25 1M0 J 2,5-7	1	RA	204
AA0754	CF RES 0W25 2M2 J 2,5-7	1	RA	327
AA0761	CF RES 0W25 4M7 J 2,5-7	1	RA	102 103
AB0585	NF RES 0W25 0R22 J 2,5-7 CF	1	RA	145 319
AB0601	NF RES 0W25 1R0 J 2,5-7 CF	1	RA	413
AB0605	NF RES 0W25 1R5 J 2,5-7 CF	1	RA	482
AB0625	NF RES 0W25 10R J 2,5-7 CF	1	ra	181
AB0809	NF RES 0W5 2R2 J 4-11 CF	1	RA	529 520
AB0641	NF RES 0W25 47R J 2,5-7 CF	1	RA	148
AB0795	NF RES 0W5 0R56 J 4-11 CF	1	RA	129 130 131
AB0785	NF RES 0W5 0R22 J 4-11 CF	2	RA	117
AB0801	NF RES 0W5 1R0 J 4-11 CF	2	RA	443
AB0653	NF RES 0W25 150R J 2,5-7	1	RA	339

Part NO	Description	PG	Item Number		
AC3268	CHIPRES 0W1 562R 1% 0805 2013	1	RA	522 523	SMA247B
AC3282	CHIPRES 0W1 787R 1% 0805 2013	1	RA	522 523	SMA231B
AC3292	CHIPRES OW1 1K00 1% 0805 201	1	RA	303 318 321	
AC3310	CHIPRES OW1 1K54 1% 0805 201	1	RA	128	
AC3316	CHIPRES OW1 1K78 1% 0805 201	1	RA	254	
AC3348	CHIPRES OW1 3K83 1% 0805 201	1	RA	119	
AC3356	CHIPRES OW1 4K64 1% 0805 20	1	RA	138	SMA247B
AC3364	CHIPRES 0W1 5K62 1% 0805 2013	1	RA	138	SMA231B
AC3372	CHIPRES 0W1 6K81 1% 0805 201	1	RA	212	
AC3388	CHIPRES 0W1 10K0 1% 0805 201	1	ra	154	
AC3396	CHIPRES 0W1 12K1 1% 0805 201	1	RA	324 146	
AC3402	CHIPRES 0W1 14K0 1% 0805 201	1	ra	237	
AC3417	CHIPRES 20K0 0W1 1% 0	1	RA	224 227 219 136	
AC3438	CHIPRES 0W1 33K2 1% 0805 201	1	RA	137	SMA247B
AC3438	CHIPRES 0W1 33K2 1% 0805 201	1	RA	225	
AC3468	CHIPRES 0W1 68K1 1% 0805 201	1	RA	147	
AC3452	CHIPRES 0W1 46400R 1% 0805 201	1	RA	122	
AC3452	CHIPRES 0W1 46400R 1% 0805 201	1	RA	137	SMA231B
AC4400	CHIPRES 0W1 0R0 5% 0805 20	1	JA	801 802 804 805 807 809 810 811 813 815	
			JA	816 817 820 822 823 824 825 826 803 806	
			JA	808 812	
AC4400	CHIPRES 0W1 0R0 5% 0805 20	1	JA	821	
AC4400	CHIPRES 0W1 0R0 5% 0805 20	1	RA	229	
AC4417	CHIPRES 0W1 4R7 5% 0805 20	1	RA	210 479 525 526	
AC4421	CHIPRES 0W1 6R8 5% 0805 20	1	RA	135	
AC4425	CHIPRES 0W1 10R 5% 0805 20	1	RA	538 419 432	
AC4433	CHIPRES 0W1 22R 5% 0805 20	1	RA	313 316	
AC4441	CHIPRES 0W1 47R 5% 0805 20	1	RA	232 283 284 285 336 348	
AC4439	CHIPRES 0W1 39R 5% 0805 20	1	RA	126	
AC4449	CHIPRES 0W1 100R 5% 0805 20	1	RA	125 314 311 253 476	
AC4455	CHIPRES 0W1 180R 5% 0805 2	1	RA	258	
AC4453	CHIPRES 0W1 150R 5% 0805 2	1	RA	343	
AC4457	CHIPRES 0W1 220R 5% 0805 2	1	RA	411	
AC4463	CHIPRES 0W1 390R 5% 0805 2	1	RA	457	
AC4465	CHIPRES 0W1 470R 5% 0805 2	1	RA	269 508 326 442 444 461 509 465 466 467	
			RA	468 469 470 344 116	
AC4467	CHIPRES 0W1 560R 5% 0805 2	1	RA	456 460	
AC4471	CHIPRES 0W1 820R 5% 0805 2	1	RA	302	
AC4473	CHIPRES 0W1 1K0 5% 0805 20	1	RA	517 511 166 484 215 163 251 421 271 512	
			RA	248 249 345 534 169 518	
AC4475	CHIPRES 0W1 1K2 5% 0805 20	1	RA	216	
AC4477	CHIPRES 0W1 1K5 5% 0805 20	1	RA	165	
AC4479	CHIPRES 0W1 1K8 5% 0805 20	1	RA	214	
AC4481	CHIPRES 0W1 2K2 5% 0805 20	1	RA	127 118 252 333 304 310 315 317	
			RA	507	
AC4481	CHIPRES 0W1 2K2 5% 0805 20	1	RA	335	SMA247B
AC4483	CHIPRES 0W1 2K7 5% 0805 20	1	RA	277 278 279 280	
AC4485	CHIPRES 0W1 3K3 5% 0805 20	1	RA	120	
AC4487	CHIPRES 0W1 3K9 5% 0805 20	1	RA	441	
AC4489	CHIPRES 0W1 4K7 5% 0805 20	1	RA	134 157 221 235 261 268 209 301 416 433	
			RA	310 335 353	
AC4489	CHIPRES 0W1 4K7 5% 0805 20	1	RA	355	SMA231B
AC4495	CHIPRES 0W1 8K2 5% 0805 20	1	RA	440 445	
AC4497	CHIPRES 0W1 10K 5% 0805 20	1	RA	124 154 155 247 298 217 206 256 533	
			RA	208 265 270 272 286 312 409 446	
			RA	448 423 519 178	
AC4497	CHIPRES 0W1 10K 5% 0805 20	1	RA	158	SMA231B
AC4499	CHIPRES 0W1 12K 5% 0805 20	1	RA	349 350	
AC4499	CHIPRES 0W1 12K 5% 0805 20	1	RA	158	SMA247B
AC4501	CHIPRES 0W1 15K 5% 0805 20	1	RA	264 346 422	
AC4505	CHIPRES 0W1 22K 5% 0805 20	1	RA	259 506 537 334 218 337 152 183	
AC4507	CHIPRES 0W1 27K 5% 0805 20	1	RA	276 417 347	
AC4509	CHIPRES 0W1 33K 5% 0805 20	1	RA	410 207 502 504 541 543	
AC4513	CHIPRES 0W1 47K 5% 0805 20	1	RA	162 330 115 122 536 516 180	
AC4513	CHIPRES 0W1 47K 5% 0805 20	1	RA	182	SMA247B
AC4515	CHIPRES 0W1 56K 5% 0805 20	1	RA	177 179	
AC4517	CHIPRES 0W1 68K 5% 0805 20	1	RA	266	

Part NO	Description	PG	Item Number		
AC4521	CHIPRES 0W1 100K 5% 0805 20	1	RA	167 156 514 340 515 531 532 535 540 175	
			ra	542	
AC4525	CHIPRES 0W1 150K 5% 0805 2	1	RA	320	
AC4527	CHIPRES 0W1 180K 5% 0805 2	1	RA	352	
AC4529	CHIPRES 0W1 220K 5% 0805 2	1	RA	530	
AC4537	CHIPRES 0W1 470K 5% 0805 2	1	RA	211 220	
AC4541	CHIPRES 0W1 680K 5% 0805 2	1	RA	505	
AC4545	CHIPRES 0W1 1M0 5% 0805 20	1	RA	539	
AC4553	CHIPRES 0W1 2M2 5% 0805 20	1	RA	201 202	
AC4561	CHIPRES 0W1 4M7 5% 0805 20	1	RA	213 234	
AC4569	CHIPRES 0W1 10M 5% 0805 20	1	RA	273	
AC8799	CHIPRES 0W12 0R0 JUMPER 1206	1	da	125	
AD0349	COMPRES 0W5 100R K 4-11	1	RA	331	
AD0373	COMPRES 0W5 1K0 K 4-11	1	RA	325	
AD0377	COMPRES 0W5 1K5 K 4-11	1	RA	449	
AD0445	COMPRES 0W5 1M0 K 4-11	1	RA	101	
AD2998	CF RES 1W0 1M0 J 4-12		ra	184	
AG3119	MF RES 0W5 1R54 F TC200 2,5	1	RA	480	
AG3133	MF RES 0W5 2R15 F TC200 2,5	1	RA	437 435	
AG3251	MF RES 0W5 33R2 F TC50 2,5	1	RA	150	
AG3289	MF RES 0W5 82R5 F TC50 2,5	1	RA	430 151 170	
AG3409	MF RES 0W5 1K21 F TC50 2,5	1	RA	144	
AG3435	MF RES 0W5 2K26 F TC50 2,5	1	RA	161	
AG3343	MF RES 0W5 274R F TC50 2,5	1	RA	481	
AG3465	MF RES 0W5 4K64 F TC50 2,5	1	RA	153 133	
AG3481	MF RES 0W5 6K81 F TC50 2,5	1	RA	474 478	
AG3489	MF RES 0W5 8K25 F TC50 2,5	1	RA	160 121	
AG3501	MF RES 0W5 10K0 F TC50 2,5	1	RA	501 503	
AG3511	MF RES 0W5 12K7 F TC50 2,5	1	RA	477	
AG3515	MF RES 0W5 14K0 F TC50 2,5	1	RA	141	
AG3519	MF RES 0W5 15K4 F TC50 2,5	1	RA	233 464	
AG3525	MF RES 0W5 17K8 F TC50 2,5	1	RA	439	
AG3530	MF RES 0W5 20K0 F TC50 2,5	1	RA	226	
AG3539	MF RES 0W5 24K9 F TC50 2,5	1	RA	521 524	
AG3551	MF RES 0W5 33K2 F TC50 2,5	1	RA	108 109	
AG3557	MF RES 0W5 38K3 F TC50 2,5	1	RA	168 475 172	
AG3573	MF RES 0W5 56K2 F TC50 2,5	1	RA	123 236	
AG3601	MF RES 0W5 100K F TC50 2,5	1	RA	110	
AG3609	MF RES 0W5 121K F TC50 2,5	1	RA	159 415	
AG3617	MF RES 0W5 147K F TC50 2,5	1	RA	447	
AG3629	MF RES 0W5 196K F TC50 2,5X	1	RA	139	
AG3657	MF RES 0W5 383K F TC50 2,5	1	RA	113 114	
AG3665	MF RES 0W5 464K F TC50 2,5	1	RA	351	
AG3681	MF RES 0W5 681K F TC50 2,5	1	RA	420	
AJ2463	MO RES 2W0 5R6 J 6-17		RA	142	SMA231B
AQ2213	TPMET.AA H10 470R RM 5X10 6-H	3	rta	302	
CA0324	CERCAP Y5P 100P K 1KV Y5 D8	1	CA	326 134 148 149 152	
CB0563	CERCAP N150 56P J 500V Y5:D10	1	CA	418	
CB0658	CERCAP N750 82P J 500V Y5: D	1	CA	129	
CB0673	CERCAP N150 100P J 50V Y5: D	1	CA	409	
CB3059	CHIPCAP NP0 220P G 50V 0	2	ca	117	
CB3131	CHIPCERCAP NP0 18P 50V J 0	1	CA	528 529	
CB3137	CHIPCERCAP NP0 33P 50V J 0	1	CA	256 257 266	
CB3141	CHIPCERCAP NP0 47P 50V J 0	1	CA	260 446 448	
CB3151	CHIPCERCAP NP0 100P 50V J 0	1	CA	161 320 155	
CB3155	CHIPCERCAP NP0 150P 50V J 0	1	CA	315	
CB3163	CHIPCERCAP NP0 330P 50V J 0	1	CA	109 115 317	
CB3167	CHIPCERCAP NP0 470P 50V J 0	2	CA	312	
CB3071	CHIPCAP NP0 680P G 50V 0	1	CA	204	
CB3175	CHIPCERCAP NP0 1N0 50V J 0	3	CA	144 309 463 222 112	
CB4002	*NEW* CHIPCAP 4N7 G 50V NP0 12	4	CA	213 111	
CB9050	*NEW*CHIPCAP 820P G 100V NP0 1	3	ca	212	
CC0110	CERCAP Y5P 150P K 500V Y5: D	1	CA	407 424	
CC0130	CERCAP Y5P 220P K 500V Y5: D	1	CA	429	
CC0140	CERCAP Y5P 270P K 500V Y5: D	1	CA	425	
CC0190	CERCAP Y5P 680P K 500V Y5: D	1	CA	146	
CC0240	CERCAP Y5P 2N2 K 500V Y5: D	1	CA	123 423	

Part NO	Description	PG		Item Number
CC0265	CERCAP Y5P 3N3 K 500V Y5:D11	2	CA	419
CC3260	CHIPCERCAP X7R 3N3 10% 50V 0	1	CA	319
CC3280	CHIPCERCAP X7R 4N7 10% 50V 0	1	CA	304 462
CC3310	CHIPCERCAP X7R 8N2 10% 50V 0	1	CA	506 507 508 514
CC3320	CHIPCERCAP X7R 10N 10% 50V 0	1	CA	261 208 513 251 262 303 318 526 442 533
CC3330	CHIPCERCAP X7R 15N 10% 50V 08	1	CA	252
CC3360	CHIPCERCAP X7R 22N 10% 50V 0	1	CA	202
CC3380	CHIPCERCAP X7R 33N 10% 50V 0	1	CA	254
CC3570	CHIP CERCAP Y5V 47N Z 50V 0	1	CA	145
CC3570	CHIP CERCAP Y5V 47N Z 50V 0	1	CA	267
CC3480	CHIP CERCAP X7R 10% 100N 25V 0	1	CA	108 110 119 263 230 206 220 223 225 258
			CA	307 308 311 313 316 445 337 405 412 505
			CA	512 338 515 516 517 518 521 524 525 523
			CA	259 143 265
CC4895	CHIPCAP Y5V 470N Z 25V 120	3	CA	510
CG2345	PPRCAP KP 220P J 63V Y5: 050	2	CA	264 447
CK2545	PESCAP 47N K 63V Y5: 030	2	CA	325 328
CK2626	PESCAP MKT 100N K 63V Y5: 030	2	CA	413 417 410 229
CK2663	PESCAP MKT 150N J 63V Y5: 040	3	CA	323
CK2663	PESCAP MKT 150N J 63V Y5: 040	3	CA	219
CK2704	PESCAP MKT 220N K 63V Y5: 040	3	CA	503 504
CK2744	PESCAP MKT 330N K 63V Y5: 051	3	CA	509
CN0128	ELCAP 0U47 M 160V RM5 : 7	3	CA	335
CN2017	ELCAP 1U0 M 50V RM5: 105' 6	2	CA	113 142 205 214 333 301 443 336 331
CN2027	ELCAP 47U M 50V RM5: 105' 9X	2	ca	154
CN2032	ELCAP 10U M 50V RM5: 105' 6	1	CA	255 314 411 511 327 140 438 224 330
CN2435	ELCAP 47U M 35V RM5: 105' 9X	2	CA	130 137 138 532 207 221 422 527
CN2543	ELCAP 100U M 50V RM5 105 11X1	2	CA	226 467
CN2563	ELCAP 2U2F M 50V RM5: 105'5X1	2	CA	211
CN2566	ELCAP 4U7F M 50V RM5: 105'6X1	2	CA	209
CN2575	ELCAP 22UF M 16V RM5: 105'6X1	1	ca	531
CN2581	ELCAP 220U M 35V RM5 105 11X1	3	CA	118 468
FA4000	CHIP INDUCTOR 600OHM 200MA 0	1	FRA	501 502 503
FJ0505	CHOKE 15UH 5% TAPED AXIAL	2	LA	301 403 201
FJ0516	CHOKE 1MH 5% TAPED AXIAL	2	LA	302
FJ0517	CHOKE 6.8UH 10% TAPED AXIAL	2	LA	501
FJ0725	BEAD INDUCTOR MIN IMP360HM	2	FRA	401 402 403
JF0025	DI 1N4148 75V 200MA 4N	1	DA	203 211 251 403
JF0032	DI UF4007 1000V 1A 75N DO41/SO	4	DA	106
JF0060	DI 1N4002 100V 1A	1	DA	430 122
JF0067	DI 1N4007 1000V 1A	1	da	116
JF0073	DI RGP10G 400V 1A 150N	2	DA	412 413 415 416 417 418 419 420
JF0106	DI UF2D-7000 200V 2A 50N MUOV	3	DA	110
JF0107	DI BYV26C 600V 1A 30N	2	DA	119 124 421
JF0206	SCHOTTKY RECTIFIER 30V 1A 1N5	4	DA	107
JF4003	DI BAV103 200V 250MA 50NS SOD	2	DA	109 123 111 201 205 208
JF4005	DI LL4148 75V 150MA 4N (JF400	1	DA	102 103 104 105 108 115 256 126 252 424
			DA	212 404 253 306 301 303 305 411 304 113
			da	114
JF4011	SCHOTTKY BARRIER 30V 200MA SOT	3	DA	255 423
JF4012	DI BAT54C 25V 200MA SCH.BAR SO	3	DA	210 217
JH0054	ZDI BZX83C12 12V 0.5W	1	DZA	301 401 402 105
JH0059	ZDI BZX83C8V2 8.2V 0.5W	1	DZA	101
JH0085	ZDI BZX83C22 22V 0.5W	1	DZA	202
JH0086	ZDI BZX83C4V7 4.7V 0.5W	1	DZA	201
JH0087	ZDI BZX83C5V1 5.1V O.5W	1	DZA	302
JH0095	ZDI BZX79B12 12V 0,5W 2	1	dza	104
JM0202	TR MPSA44 N 400V 300MA T	3	TA	102
JM0203	TR MPSA42 N 300V 500MA TO	3	TA	414 416
JM0205	TR BF423 P 250V 25MA 6	3	TA	315
JM0239	TR BC638 P 60V 1A 5	4	TA	106
JM0244	TR BF422 N 250V 25MA 60M: T	2	TA	312 316 410 413
JM0273	TR 2N5551 NPN 160V 0,6A	2	TA	107 201 121 313 314
JM0280	TR 2N5401 P 150V 0.6A 10	2	TA	411
JM0285	TR BC637-16 N 40V 1A 6	4	TA	412
JM4119	TR BC817 N 45V 1A SOT	2	TA	120
JS0035	FET IRF820 N 500V 2.5A 3.0R	5	TA	109

Part NO	Description	PG	Item Number	
JM4105	TR BC847B N 45V 0.1A SOT23	1	TA	115 116 505 402 503 302 304 307 310
			TA	404 406 501 317 108
JM4114	TR BC857B P 45V 100MA 150M	2	TA	104 111 112 114 202 204 301 303 306 309
			TA	504 419 502 405 407 415 417 105
JM4401	TR BCR141W 50V 0.1A (2X22K)SOT	2	TA	110 117 205 119 103
LM4016	IC 74HCT86 4X2-INPUT EX-OR S	6	ICA	204
LM4111	IC 4538BT	5	ICA	401
LM4114	IC 4050B HEX BUFER SO-16	6	ICA	301
LM4420	IC DUAL MODE EEPROM FOR DDC 2.	7	ICA	205
SE2761	MICROPHONE CABLE 447R L=700			
QK0530	WIRE CONN BODY 1X02 2,5 CRIMP	2		006
QK0823	CRIMP CONTACT FOR MKH-SERIE	1		005
QP0002	MICROPH.ELECT.COND.D=9.7MM -47	11		002
UG1033	MICROPHONE TUBE(CAMERA) DTC 44	3		004
UL0711	GASKET, SILICON 447Z DN40	2		003
SE2766	EXT MIC WIRE 447R AUDIO			
QK0530	WIRE CONN BODY 1X02 2,5 CRIMP	2		004
QK0823	CRIMP CONTACT FOR MKH-SERIE	1		002
QK0824	WIRE CONN BODY 1X03 2,5 CRIMP	2		003
SE2687	FLAT CABLE VERTICALE 3-POLE 4			
SE2747	GROUNDING WIRE 446B/447U			
QK1081	BLADE CONN 4,8MM FEMALE	1		002
QK1651	BLADE CONNECTOR ”MIKROLOK” 6,3	1		003
SE2679	GROUNDING WIRE 447S			
QK1446	WIRE TERMINAL FOR 1,85MM HOLES	1		003
QK1651	BLADE CONNECTOR ”MIKROLOK” 6,3	1		002
UCX012	DIODE/COOLING PLATE ASSEMBLY J			
JF0166	DIODE BYM26C 600V 2.3A SOD-64	6		
XS0094	WIRE TINNED COPPER D=0,60MM			

Part NO	Description	PG	Item Number		
SH1813	KONELAD.SMA231Y SB5241				
AJ2463	MO RES 2W0 5R6 J 6-17	2	RA	142	SMA231
AJ2523	MO RES 2W0 10R J 6-17	2	RA	438	
AJ2603	MO RES 2W0 22R J 6-17	2	RA	142 143	SMA247
AJ2763	MO RES 2W0 100R J 6-17	2	RA	434 452	
AJ2923	MO RES 2W0 470R J 6-17	2	RA	132	
AJ2927	MO RES 6W0 470R J 9-33	4	RA	453	
AJ2983	MO RES 2W0 820R J 6-17	2	RA	454	
AJ3003	MO RES 2W0 1K0 J 6-17	2	RA	149 140	
AJ3103	MO RES 2W0 2K7 J 6-17	2	RA	455	
AJ3403	MO RES 2W0 47K J 6-17	2	RA	112	
AQ2218	TPMET.AA H10 22K RM 5X10 6-H	3	RTA	301	
AQ2745	TPMET.AA V10 10K RM5X2,5 6-HO	1	RTA	402	
AQ2740	TPMET.AA V10 4K7 RM5X2,5 6-HO	3	RTA	403	
AW0079	PTC-THERMISTOR 18R/25'C RM5	7	PTCA	101 102	
AW0111	NTC-THERMISTOR 5R0/25'C RM5+	7	NTCA	101	
CA0322	CERCAP Y5P 2N2 K 1KV Y5: D	2	CA	324	
CB0473	CERCAP SL 33P J 500V Y5: D	1	CA	253	
CB9050	*NEW*CHIPCAP 820P G 100V NP0 1	3	CA	204	
CC0200	CERCAP Y5P 1N0 K 500V Y5: D	1	CA	216	
CC0513	CERCAP Y5V 3N3 S 1KV Y7,5 D	2	CA	125 126	
CC0551	CERCAP Z5U 10N S 500V Y7,5	1	CA	414	
CE0085	X2-CAP 470N M 275VAC Y22.5 PLA	7	CA	101	
CE0126	Y-CAP 4N7 M 400VAC Y12,5 SDP	4	CA	102 103 106 107	
CE2004	IMPCAP 100P K 1K6V Y15 051	3	CA	122	
CE2154	IMPCAP 1N5 K 1K5V Y22,5 071	4	CA	310	
CE2196	IMPCAP 2N2 J 2KV Y22,5 081	4	CA	416	
CE2671	IMPCAP 33N J 400V Y15 061	4	CA	435	
CE2802	IMPCAP 51N J 400V Y15 081	3	CA	421	
CE2852	IMPCAP 68N J 400V Y15 081	4	CA	434	
CE2940	IMPCAP 120N J 400V Y22,5 091	6	CA	427	
CE2974	IMPCAP 150N K 400V Y22,5 091	7	CA	433 426	
CE3043	IMPCAP 270N J 400V Y22.5	1	CA	432	
CE3133	IMPCAP 560N J 250V Y22,5 112	8	CA	431	
CE3224	IMPCAP 1U2 J 250V Y22,5 112	6	CA	430	
CK0163	PESCAP MKT 22N K 250V Y10 051	2	CA	408	
CK0165	PESCAP MKT 22N K 630V Y10 061	2	CA	120 121	
CK0221	PESCAP MKT 47N J 250V Y10 051	2	CA	203	
CK0341	PESCAP MKT 220N K 100V Y10 051	3	CA	464	
CK1388	PESCAP MKT 10N K 250V Y7,5 040	2	CA	306	
CK2784	PESCAP MKT 470N K 63V Y5: 051	3	CA	218	
CK2864	PESCAP MKT 1U0 K 50V Y5:0611	5	CA	334	
CN0095	ELCAP 330U M 385V RM10 30 X 45	19	CA	105	
CN2232	ELCAP' 4U7 M 200V RM5 105'10	4	CA	201	
CN2461	ELCAP- 47U M 100V RM5 105, 10	4	CA	124	
CN2476	ELCAP 47U M 250V RM7,5 105'17X	5	CA	131 132 406	
CN2546	ELCAP 100UF M 100V RM5 105' 14	5	CA	135	
CN0727	ELCAP 1000U M 25V RM5 14	4	CA	141	
CN2712	ELCAP 1000U M 16V RM5: 105'11X	5	CA	415 466	
CN2749	ELCAP 2200U M 16V RM5 105 14X	4	CA	139 133 520 522	
CN3427	ELCAP,2200U M 25V RM7,5 105'16	6	CA	136	
CN3250	ELCAP, 47U M 250V RM7,5 105'16	5	CA	305	
FJ0448	CHOKE 13UH FERRITE 2X15	2	LA	101 102 103 104 105 107	
FJ0724	CHOKE 470UH 10% 5 MM RADIAL	4	LA	402	
FJ0800	EMI/RFI CHOKE 60MH 3A(AC)	9	MA	101	
FJ1836	INPUT CHOKE LFZ2805V08 8MH 2A	8	MA	102	
FJ3001	DEFL.INPUT CHOKE E25/7	10	MA	401	
FM2560	DYNAMIC FOCUS TRAFO E20/6 445	12	MA	404	
FM2584	DRIVER TRAFO EF16/E13 4	7	MA	403	
FM3407	SMPS-TRAFO ETD44 N27 447R	17	MA	103	SMA231
FM3410	SMPS-TRAFO ETD44 TUBE 96KH	16	MA	103	SMA247
FM0651	FLYBACK TRAFO 30.120KH 2XHVC	30	MA	301	
FU0734	FIXED LIN.COIL W/ADJ.COIL 4	13	LA	401	
JB0042	DI BY459X 1500V 10A 0,25/0,5US	13	DA	414	
JB0100	DI GBU4K BRIDGE 800V 4A	8	DA	101	
JF0033	DI UF5404 400V 3A 50NS DO20	4	DA	407	
JF0145	DI BYM26E 1000V 2.3A 75NS	7	DA	302	

Part NO	Description	PG	Item Number		
JF0090	DI MR854 400V 3A 200N	4	DA	410	
JF0096	DI BYV28-100 100V 3.5A 30N	4	DA	422	
JF0166	DIODE BYM26C 600V 2.3A SOD-64	6	DA	118 117	
JF0168	DIODE BYW98-200 200V 3A DO-27	4	DA	121 128	
JL0069	OPTOCOUPLER VRMS 5KV	4	ICA	102 103	
JM0334	TR BD135 NPN 45V 1A5 250MHZ TO	4	TA	118	
JM0340	TR BUH1015 N 1500V 14A ISOWATT	15	TA	409	
JS0078	FET STP7NB60FP N 600V 3.5A 1R2	9	TA	101	
JS0051	FET IRF9540 P 100V 19A 0.2R TO	7	TA	408	
JS0049	FET 2SJ306 P 250V 3A 1.5R TO2	15	TA	403	
JS0049	FET 2SJ306 P 250V 3A 1.5R TO2	15	TA	305	
JS0058	FET IRF9620 P 200V 1R5 3A TO22	7	TA	122	
JS0079	FET STP4NB80FP N 800V 2,1A 3R0	10	TA	308	
JS2002	FETARRAY SLA5054 6X150V 5A, 7A	19	ICA	402	
JZ0020	SILICONE INSUL. 13X19MM	1	TA	408 109	
JZ0022	SILICONE INSUL. 22X30MM	3	ICA	502	
JZ0023	SILICONE INSUL. 10X13MM	1	TA	118	
JZ0020	SILICONE INSUL. 13X19MM	1	ICA	403	
LM0603	IC LM2940CT LOW DROP REG.5V TO	8	ICA	105	
LM0763	IC UC3842 CURRENT MODE PWM CON	8	ICA	101	
LM0942	IC TL431 VOLTAGE REFERENCE TO-	4	ICA	104	
LM0956	IC TDA9309 VERT.DEFL.BOOSTER H	8	ICA	403	
LM0957	IC UC3843 CURR.MODE PWM CON.DI	6	ICA	302	
LM0967	IC SI-3120FA 12V LOWDROP REG 2	9	ICA	106	
LM0974	IC LM4832N BOOMER DI	18	ICA	501	
LM0981	IC M24128 EEPROM 128K (16X8) D	13	ICA	203	
LM0996	IC TDA7499 AUDIO AMP.2X6W M&ST	12	ICA	502	
LM1006	IC TDA9109/SN DEFL.PROC. SDIP3	17	ICA	201	
LM1007	IC ST72T752J6B1 MCU 32ROM SDI	25	ICA	202	
LZ0077	IC-SOCKET 42-POLE DUAL LEAF 1.	6	ICA	202	
QA0098	CRYSTAL 24.000MHZ FUNDAM. HC-4	6	XA	251	
QH0065	RELAY PCB-MOUNTING 12V 5A/250V	12	REA	101	
QM1060	PICOFLEX ASSY IDC-ICD 6-POS 20	6	QA	203	
QK1284	ROW CONN 1X02 7,62 VERT/LOCK	2	QA	102	
QK1287	PIN STRIP 1X04 8,0/10.0 VERT M	3	QA	404	
QK1587	COOLING & SUPP.PART FOR RESIST	1	RA	453 454	
QK1632	ROW CONN 1X02 2,5 V STGLOCK S	2	QA	504	
QK1633	ROW CONN 1X03 2,5 V STGLOCK SN	2	QA	503	
QK1694	RCA JACK UNIT 2X6.3MM R/W PCB9	6	QA	501	
QK0851	TAP CONN RTM 1,3/5/8.002	8	QA	401	
QK1701	PICOFLEX HEADER 1X04 1,27MM	3	QA	104 505	
QK1702	PICOFLEX HEADER 1X06 1,27MM	3	QA	203	
QK1463	ROW CONN "JST" 1X02 2,5 VERT	2	QA	301	
QK1712	PIN JACK 3,6MM MONO H=6,5MM	3	QA	502	
QK1754	FUSEFIT AC INLET FOR PCB VERT.	7	QA	101	
QM1059	PICOFLEX ASSY IDC-ICD 4POS 350	5	QA	104	SMA231
QM1060	PICOFLEX ASSY IDC-IDC 6POS 200		QA	203	SMA231
QM1013	PICOFLEX ASSY BI-IDC 10-POS 40	8	QA	105	
QM1019	PICOFLEX ASSY BI-IDC 16-POS 42	11	QA	201	
QT0002	SPARK GAP 1,2KV +-500V R=5,0MM	3	GLA	302 303	
QT0207	GLIMM LAMP 95V 6*12,5MM	4	GLA	301	
QT0733	FUSE R=5,0MM T 3,15A 250V IEC	4	FA	102 104	
QT0775	FUSE 5*20MM T 6,3A 250V 1500A	3	QA	101	
SE2761	MICROPHONE CABLE 447R L=700	14			
SE2766	EXT MIC WIRE 447R AUDIO	11	QA	503	
SE2687	FLAT CABLE VERTICALE 3-POLE 4	3	QA	402 403	
SE2747	GROUNDING WIRE 446B/447U	4			
SE2679	GROUNDING WIRE 447S	3	WA	301	
UC0859	SPRING DN44	2	TA	305 308 408 403 109	
			ICA	105 106	
UC1140	COOLING PLATE DN CU	2	TA	305 308 408 118 109	
			ICA	105 106	
UC6837	COOLING PLATE	8	TA	403	
UC6551	SPRING DN 49256	3	TA	101	
			ICA	403	
			DA	414	
UC6552	FASTSPRING DN 49257	3	TA	409	

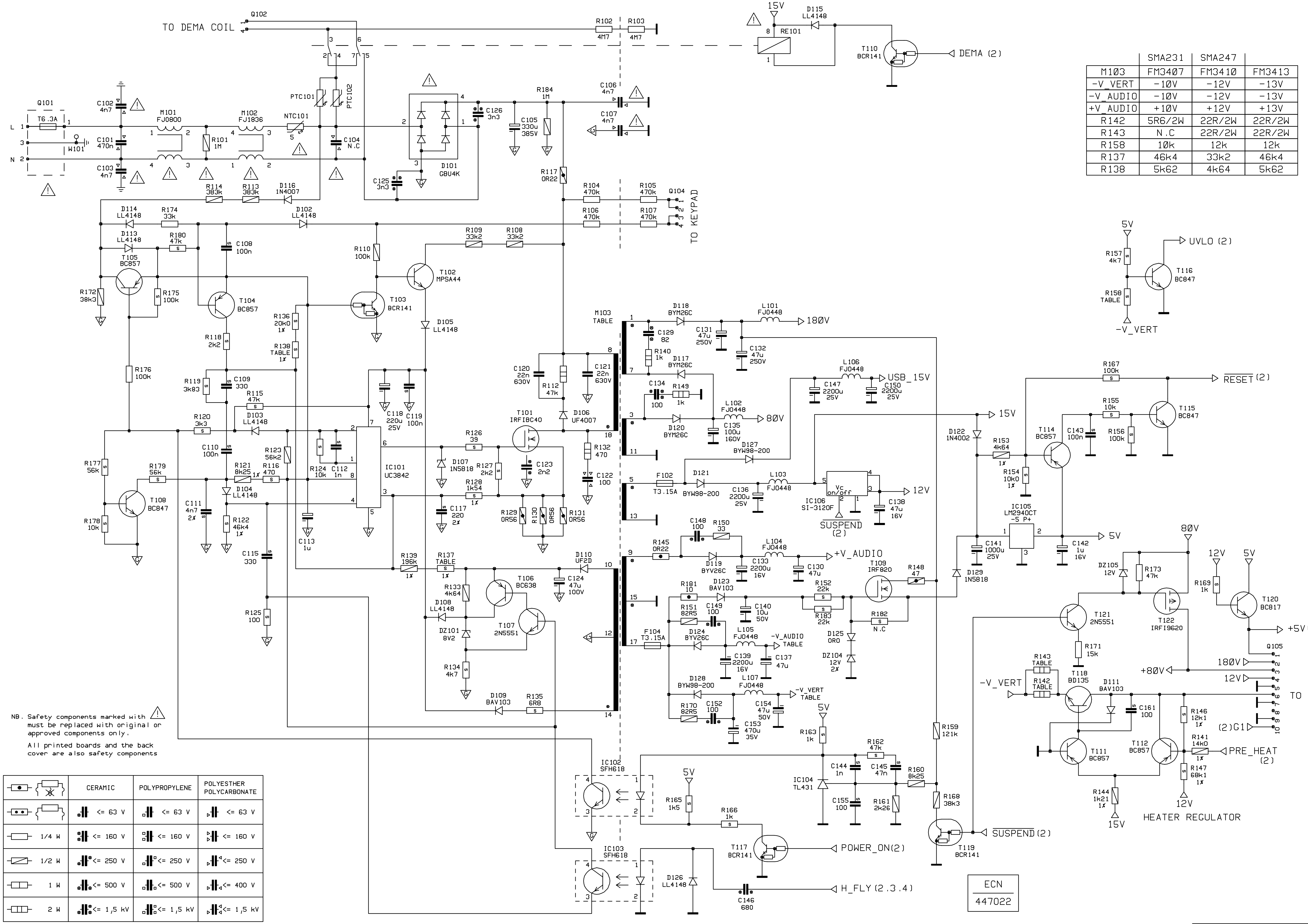
Part NO	Description	PG	Item Number	
			ICA	502
UC6668	FASTSRING TO126	2	TA	118
UC7063	GROUNDING SPRING 447R	3		
UC6946	MAAD.JOUSI/GROUNDING SPRING 44	2		
UC6862	KIINNITYSJOUSI/FAST.SPRING 447	2	ICA	402
			DA	101
UC6995	COOLING PLATE 447Y	15	TA	101
UC7040	COOLING PLATE 447R	15	TA409 DA41	ICA402 ICA502
UC7041	COOLING PLATE 447R	13	ICA	403
UC7109	GROUNDING SPRING 447R	2	EA	101
UC6752	ALUSLEVY 447E	1		
UC7042	CONNECTOR PANEL 447R	7		
UC7043	SUPPORT 447R	16		
UCX012	DIODE/COOLING PLATE ASSEMBLY J	5	DA	120
UJ0125	TIES/JOHTOSIDOKE SST 1 M	1		
UG0770	JOHTOPIDIKE SIS. MITAT 11X20MM	3		
UG0814	INSULATOR PN30084 447K	1		
UG1069	HOLKKI/SLEEVE DN40329 22.4 GRE	1		
XW0032	DC340 HEAT SINK,DOW CORNING		TA	118 305 308 408 403 409 101
			ICA	106 105 502 402
			DA	414
WC0036	KUUS.KAN.LEVYR.UNI6950 SCREW	1		
WC0446	KUUS.KANT.-TYLPPÄ 2,9X8 FE/ZN	1		
WC0530	SCREW 2,9X10 YELLOW FE/ZN	1	MA	301
WC0542	PT-SCREW K40X35 WN1447 TORX10	2	MA	301
JS0035	FET IRF820 N 500V 2.5A 3.0R	5	TA	109
UC7144	COOLING PLATE 447R	12	DA	101
AQ2213	TPMET.AA H10 470R RM 5X10 6-H	3	RTA	302
AJ2663	MO RES 2W0 39R J 6-17	2	RA	451
CN3343	ELCAP' 470U M 35V RM5 105' 14	3	CA	153
XW0260	SULATELIIMA JET-MELT 3796 TC	2		
CE2195	IMPCAP 2N2 H 2KV Y22.5 071727	5	CA	420
CE3292	IMCAP 2U2 J 250V Y27.5 142	12	CA	428
FM4002	CENTERING COIL E25/7 4	10	MA	402
SE2787	GROUNDING CABLE 447O			
SE2783	GROUNDING WIRE 445Z	3		FOL 402 403
SH1813	KONELAD.SMA231Y SB5241			
SB5241	PCB 447O SMA231 FR2 1S 1P SB52			
AA0625	CF RES 0W25 10R J 2,5-7	1	RA	223 527 408
AA0633	CF RES 0W25 22R J 2,5-7	1	RA	450
AA0643	CF RES 0W25 56R J 2,5-7	1	RA	436
AA0649	CF RES 0W25 100R J 2,5-7	1	RA	305 307 418 281 282 296 297 513
AA0657	CF RES 0W25 220R J 2,5-7	1	RA	329
AA0673	CF RES 0W25 1K0 J 2,5-7	1	RA	274 260 267 431 205 463 459
AA0677	CF RES 0W25 1K5 J 2,5-7	1	RA	341
AA0681	CF RES 0W25 2K2 J 2,5-7	1	RA	306 342 332
AA0689	CF RES 0W25 4K7 J 2,5-7	1	RA	290 295 294 291 292 293
AA0695	CF RES 0W25 8K2 J 2,5-7	1	RA	528
AA0697	CF RES 0W25 10K J 2,5-7	1	RA	230 228 257 238
AA0699	CF RES 0W25 12K J 2,5-7	1	RA	338
AA0701	CF RES 0W25 15K J 2,5-7	1	RA	255 171
AA0705	CF RES 0W25 22K J 2,5-7	1	RA	263
AA0713	CF RES 0W25 47K J 2,5-7	1	RA	173
AA0715	CF RES 0W25 56K J 2,5-7	1	RA	275
AA0729	CF RES 0W25 220K J 2,5-7	1	RA	328
AA0737	CF RES 0W25 470K J 2,5-7	1	RA	104 105 106 107 203
AA0745	CF RES 0W25 1M0 J 2,5-7	1	RA	204
AA0754	CF RES 0W25 2M2 J 2,5-7	1	RA	327
AA0761	CF RES 0W25 4M7 J 2,5-7	1	RA	102 103
AB0585	NF RES 0W25 0R22 J 2,5-7 CF	1	RA	145 319
AB0601	NF RES 0W25 1R0 J 2,5-7 CF	1	RA	413
AB0605	NF RES 0W25 1R5 J 2,5-7 CF	1	RA	482
AB0809	NF RES 0W5 2R2 J 4-11 CF	1	RA	529 520
AB0641	NF RES 0W25 47R J 2,5-7 CF	1	RA	148
AB0795	NF RES 0W5 0R56 J 4-11 CF	1	RA	129 130 131

Part NO	Description	PG	Item Number		
AB0785	NF RES 0W5 0R22 J 4-11 CF	2	RA	117	
AB0801	NF RES 0W5 1R0 J 4-11 CF	2	RA	443	
AB0653	NF RES 0W25 150R J 2,5-7	1	RA	339	
AC3292	CHIPRES OW1 1K00 1% 0805 201	1	RA	303 318 321	
AC3310	CHIPRES OW1 1K54 1% 0805 201	1	RA	128	
AC3316	CHIPRES OW1 1K78 1% 0805 201	1	RA	254	
AC3348	CHIPRES OW1 3K83 1% 0805 201	1	RA	119	
AC3372	CHIPRES 0W1 6K81 1% 0805 201	1	RA	212	
AC3372	CHIPRES 0W1 6K81 1% 0805 201	1	RA	522	SMA247
AC3372	CHIPRES 0W1 6K81 1% 0805 201	1	RA	523	SMA247
AC3392	CHIPRES 0W1 11K0 1% 0805 2013	1	RA	522	SMA231
AC3392	CHIPRES 0W1 11K0 1% 0805 2013	1	RA	523	SMA231
AC3396	CHIPRES 0W1 12K1 1% 0805 201	1	RA	324 146	
AC3417	CHIPRES 20K0 0W1 1% 0	1	RA	224 227 219 136	
AC3438	CHIPRES 0W1 33K2 1% 0805 201	1	RA	225	
AC3468	CHIPRES 0W1 68K1 1% 0805 201	1	RA	147	
AC4400	CHIPRES 0W1 0R0 5% 0805 20	1	JA	801 802 804 805 807 809 810 811 813 815	
			JA	816 822 823 824 825 826	
			JA	803 806 808 812 821	
			RA	229	
AC4417	CHIPRES 0W1 4R7 5% 0805 20	1	RA	210 479 525 526	
AC4421	CHIPRES 0W1 6R8 5% 0805 20	1	RA	135	
AC4425	CHIPRES 0W1 10R 5% 0805 20	1	RA	538 419 432	
AC4433	CHIPRES 0W1 22R 5% 0805 20	1	RA	313 316	
AC4439	CHIPRES 0W1 39R 5% 0805 20	1	RA	126	
AC4441	CHIPRES 0W1 47R 5% 0805 20	1	RA	232 283 284 285 336 348	
AC4449	CHIPRES 0W1 100R 5% 0805 20	1	RA	125 314 311 253 476	
AC4455	CHIPRES 0W1 180R 5% 0805 2	1	RA	258	
AC4453	CHIPRES 0W1 150R 5% 0805 2	1	RA	343	
AC4457	CHIPRES 0W1 220R 5% 0805 2	1	RA	411	
AC4463	CHIPRES 0W1 390R 5% 0805 2	1	RA	457	
AC4465	CHIPRES 0W1 470R 5% 0805 2	1	RA	269 508 326 442 444 461 509 465 466 467	
			RA	468 469 470 344 116	
AC4467	CHIPRES 0W1 560R 5% 0805 2	1	RA	456 460	
AC4471	CHIPRES 0W1 820R 5% 0805 2	1	RA	302	
AC4473	CHIPRES 0W1 1K0 5% 0805 20	1	RA	517 511 166 484 215 163 251 421 271 512	
			RA	248 249 345 534 169 518	
AC4475	CHIPRES 0W1 1K2 5% 0805 20	1	RA	216	
AC4477	CHIPRES 0W1 1K5 5% 0805 20	1	RA	165	
AC4479	CHIPRES 0W1 1K8 5% 0805 20	1	RA	214	
AC4481	CHIPRES 0W1 2K2 5% 0805 20	1	RA	127 118 252 333 304 315 317 507	
AC4481	CHIPRES 0W1 2K2 5% 0805 20	1	RA	335	SMA231
AC4483	CHIPRES 0W1 2K7 5% 0805 20	1	RA	277 278 279 280	
AC4485	CHIPRES 0W1 3K3 5% 0805 20	1	RA	120	
AC4487	CHIPRES 0W1 3K9 5% 0805 20	1	RA	441	
AC4489	CHIPRES 0W1 4K7 5% 0805 20	1	RA	134 157 221 235 261 268 209 301 416 433	
			RA	310 353	
AC4489	CHIPRES 0W1 4K7 5% 0805 20	1	RA	335	SMA247
AC4495	CHIPRES 0W1 8K2 5% 0805 20	1	RA	440 445	
AC4497	CHIPRES 0W1 10K 5% 0805 20	1	RA	124 155 247 298 217 206 256 533	
			RA	208 265 270 272 286 312 409 446	
			RA	448 423 519 178	
AC4497	CHIPRES 0W1 10K 5% 0805 20	1	RA	158	SMA231
AC4499	CHIPRES 0W1 12K 5% 0805 20	1	RA	349 350	
AC4499	CHIPRES 0W1 12K 5% 0805 20	1	RA	158	SMA247
AC4501	CHIPRES 0W1 15K 5% 0805 20	1	RA	264 346 422	
AC4505	CHIPRES 0W1 22K 5% 0805 20	1	RA	259 506 537 334 218 337 152 183	
AC4507	CHIPRES 0W1 27K 5% 0805 20	1	RA	276 417 347	
AC4509	CHIPRES 0W1 33K 5% 0805 20	1	RA	410 207 502 504 541 543	
AC4513	CHIPRES 0W1 47K 5% 0805 20	1	RA	162 330 115 536 516 180 182	
AC4517	CHIPRES 0W1 68K 5% 0805 20	1	RA	266	
AC4521	CHIPRES 0W1 100K 5% 0805 20	1	RA	167 156 514 340 515 531 532 535 540 175	
			RA	542	
AC4525	CHIPRES 0W1 150K 5% 0805 2	1	RA	320	
AC4527	CHIPRES 0W1 180K 5% 0805 2	1	RA	352	
AC4529	CHIPRES 0W1 220K 5% 0805 2	1	RA	530	
AC4537	CHIPRES 0W1 470K 5% 0805 2	1	RA	211 220	

Part NO	Description	PG	Item Number	
AC4541	CHIPRES 0W1 680K 5% 0805 2	1	RA	505
AC4545	CHIPRES 0W1 1M0 5% 0805 20	1	RA	539
AC4553	CHIPRES 0W1 2M2 5% 0805 20	1	RA	201 202
AC4561	CHIPRES 0W1 4M7 5% 0805 20	1	RA	213 234
AC4569	CHIPRES 0W1 10M 5% 0805 20	1	RA	273
AC8799	CHIPRES 0W12 0R0 JUMPER 1206	1	DA	125
AD0349	COMPRES 0W5 100R K 4-11	1	RA	331
AD0373	COMPRES 0W5 1K0 K 4-11	1	RA	325
AD0377	COMPRES 0W5 1K5 K 4-11	1	RA	449
AD0445	COMPRES 0W5 1M0 K 4-11	1	RA	101
AG3119	MF RES 0W5 1R54 F TC200 2,5	1	RA	480
AG3133	MF RES 0W5 2R15 F TC200 2,5	1	RA	437 435
AG3251	MF RES 0W5 33R2 F TC50 2,5	1	RA	150
AG3289	MF RES 0W5 82R5 F TC50 2,5	1	RA	430 151 170
AG3409	MF RES 0W5 1K21 F TC50 2,5	1	RA	144
AG3435	MF RES 0W5 2K26 F TC50 2,5	1	RA	161
AG3343	MF RES 0W5 274R F TC50 2,5	1	RA	481
AG3465	MF RES 0W5 4K64 F TC50 2,5	1	RA	153 133
AG3481	MF RES 0W5 6K81 F TC50 2,5	1	RA	478 474
AG3489	MF RES 0W5 8K25 F TC50 2,5	1	RA	121 160
AG3501	MF RES 0W5 10K0 F TC50 2,5	1	RA	501 503
AG3511	MF RES 0W5 12K7 F TC50 2,5	1	RA	477
AG3515	MF RES 0W5 14K0 F TC50 2,5	1	RA	141
AG3519	MF RES 0W5 15K4 F TC50 2,5	1	RA	233 464
AG3525	MF RES 0W5 17K8 F TC50 2,5	1	RA	439
AG3530	MF RES 0W5 20K0 F TC50 2,5	1	RA	226
AG3539	MF RES 0W5 24K9 F TC50 2,5	1	RA	521 524
AG3551	MF RES 0W5 33K2 F TC50 2,5	1	RA	108 109
AG3557	MF RES 0W5 38K3 F TC50 2,5	1	RA	168 475 172
AG3573	MF RES 0W5 56K2 F TC50 2,5	1	RA	123 236
AG3601	MF RES 0W5 100K F TC50 2,5	1	RA	110
AG3609	MF RES 0W5 121K F TC50 2,5	1	RA	159 415
AG3617	MF RES 0W5 147K F TC50 2,5	1	RA	447
AG3665	MF RES 0W5 464K F TC50 2,5	1	RA	351
AG3681	MF RES 0W5 681K F TC50 2,5	1	RA	420
CA0324	CERCAP Y5P 100P K 1KV Y5 D8	1	CA	326 134 148 149 152
CB0563	CERCAP N150 56P J 500V Y5:D10	1	CA	418
CB0658	CERCAP N750 82P J 500V Y5: D	1	CA	129
CB0673	CERCAP N150 100P J 50V Y5: D	1	CA	409
CB3131	CHIPCERCAP NP0 18P 50V J 0	1	CA	528 529
CB3137	CHIPCERCAP NP0 33P 50V J 0	1	CA	256 257 266
CB3141	CHIPCERCAP NP0 47P 50V J 0	1	CA	260 446 448
CB3151	CHIPCERCAP NP0 100P 50V J 0	1	CA	161 320 155
CB3155	CHIPCERCAP NP0 150P 50V J 0	1	CA	315
CB3163	CHIPCERCAP NP0 330P 50V J 0	1	CA	109 115 317
CB3167	CHIPCERCAP NP0 470P 50V J 0	2	CA	312
CB3071	CHIPCAP NP0 680P G 50V 0	1	CA	204
CB3175	CHIPCERCAP NP0 1N0 50V J 0	3	CA	144 309 463 222 112
CB4002	*NEW* CHIPCAP 4N7 G 50V NP0 12	4	CA	111 213
CC0110	CERCAP Y5P 150P K 500V Y5: D	1	CA	407 424
CC0130	CERCAP Y5P 220P K 500V Y5: D	1	CA	429
CC0140	CERCAP Y5P 270P K 500V Y5: D	1	CA	425
CC0190	CERCAP Y5P 680P K 500V Y5: D	1	CA	146
CC0240	CERCAP Y5P 2N2 K 500V Y5: D	1	CA	123 423
CC0265	CERCAP Y5P 3N3 K 500V Y5:D11	2	CA	419
CC3260	CHIPCERCAP X7R 3N3 10% 50V 0	1	CA	319
CC3280	CHIPCERCAP X7R 4N7 10% 50V 0	1	CA	304 462
CC3310	CHIPCERCAP X7R 8N2 10% 50V 0	1	CA	506 507 508 514
CC3320	CHIPCERCAP X7R 10N 10% 50V 0	1	CA	261 208 513 251 262 303 318 526 442 533
CC3330	CHIPCERCAP X7R 15N 10% 50V 08	1	CA	252
CC3360	CHIPCERCAP X7R 22N 10% 50V 0	1	CA	202
CC3380	CHIPCERCAP X7R 33N 10% 50V 0	1	CA	254
CC3570	CHIP CERCAP Y5V 47N Z 50V 0	1	CA	145
CC3570	CHIP CERCAP Y5V 47N Z 50V 0	1	CA	267
CC3480	CHIP CERCAP X7R 10% 100N 25V 0	1	CA	108 110 119 263 230 206 220 223 225 258
			CA	307 308 311 313 316 445 337 405 412 505
			CA	512 338 515 516 517 518 521 524 525 523

Part NO	Description	PG	Item Number	
			CA	259 143 265
CC4895	CHIPCAP Y5V 470N Z 25V 120	3	CA	510
CG2345	PPRCAP KP 220P J 63V Y5: 050	2	CA	264 447
CK2545	PESCAP 47N K 63V Y5: 030	2	CA	325 328
CK2626	PESCAP MKT 100N K 63V Y5: 030	2	CA	229 410 413 417
CK2663	PESCAP MKT 150N J 63V Y5: 040	3	CA	323
CK2663	PESCAP MKT 150N J 63V Y5: 040	3	CA	219
CK2704	PESCAP MKT 220N K 63V Y5: 040	3	CA	503 504
CK2744	PESCAP MKT 330N K 63V Y5: 051	3	CA	509
CN0128	ELCAP 0U47 M 160V RM5 : 7	3	CA	335
CN2017	ELCAP 1U0 M 50V RM5: 105' 6	2	CA	113 142 205 214 333 301 443 336 331
CN2032	ELCAP 10U M 50V RM5: 105' 6	1	CA	140 224 255 314 327 330 411 438 511
CN2435	ELCAP 47U M 35V RM5: 105' 9X	2	CA	130 137 138 532 207 221 422 527
CN2543	ELCAP 100U M 50V RM5 105 11X1	2	CA	226 467
CN2563	ELCAP 2U2F M 50V RM5: 105'5X1	2	CA	211
CN2566	ELCAP 4U7F M 50V RM5: 105'6X1	2	CA	209
CN2581	ELCAP 220U M 35V RM5 105 11X1	3	CA	118 468
FA4000	CHIP INDUCTOR 600OHM 200MA 0	1	FRA	501 502 503
FJ0505	CHOKE 15UH 5% TAPED AXIAL	2	LA	301 403 201
FJ0516	CHOKE 1MH 5% TAPED AXIAL	2	LA	302
FJ0517	CHOKE 6.8UH 10% TAPED AXIAL	2	LA	501
FJ0725	BEAD INDUCTOR MIN IMP360HM	2	FRA	401 402 403
JF0025	DI 1N4148 75V 200MA 4N	1	DA	203 211 251 403
JF0032	DI UF4007 1000V 1A 75N DO41/SO	4	DA	106
JF0060	DI 1N4002 100V 1A	1	DA	430 122
JF0073	DI RGP10G 400V 1A 150N	2	DA	412 413 415 416 417 418 419 420
JF0106	DI UF2D-7000 200V 2A 50N MUOV	3	DA	110
JF0107	DI BYV26C 600V 1A 30N	2	DA	119 124 421
JF0206	SCHOTTKY RECTIFIER 30V 1A 1N5	4	DA	107
JF4003	DI BAV103 200V 250MA 50NS SOD	2	DA	109 123 111 201 205 208
JF4005	DI LL4148 75V 150MA 4N (JF400	1	DA	102 103 104 105 108 115 256 126 252 424
			DA	212 404 253 306 301 303 305 411 304 113
			DA	114
JF4011	SCHOTTKY BARRIER 30V 200MA SOT	3	DA	255 423
JF4012	DI BAT54C 25V 200MA SCH.BAR SO	3	DA	210 217
JH0054	ZDI BZX83C12 12V 0.5W	1	DZA	301 401 402 105
JH0059	ZDI BZX83C8V2 8.2V 0.5W	1	DZA	101
JH0085	ZDI BZX83C22 22V 0.5W	1	DZA	202
JH0086	ZDI BZX83C4V7 4.7V 0.5W	1	DZA	201
JH0087	ZDI BZX83C5V1 5.1V O.5W	1	DZA	302
JH0095	ZDI BZX79B12 12V 0,5W 2	1	DZA	104
JM0202	TR MPSA44 N 400V 300MA T	3	TA	102
JM0203	TR MPSA42 N 300V 500MA TO	3	TA	414 416
JM0205	TR BF423 P 250V 25MA 6	3	TA	315
JM0239	TR BC638 P 60V 1A 5	4	TA	106
JM0244	TR BF422 N 250V 25MA 60M: T	2	TA	312 316 410 413
JM0273	TR 2N5551 NPN 160V 0,6A	2	TA	107 201 121 313 314
JM0280	TR 2N5401 P 150V 0.6A 10	2	TA	411
JM0285	TR BC637-16 N 40V 1A 6	4	TA	412
JM4119	TR BC817 N 45V 1A SOT	2	TA	120
JM4105	TR BC847B N 45V 0.1A SOT23	1	TA	115 116 505 402 503 302 304 307 310
			TA	404 406 501 317 108
JM4114	TR BC857B P 45V 100MA 150M	2	TA	104 111 112 114 202 204 301 303 306 309
			TA	504 419 502 405 407 415 417 105
JM4401	TR BCR141W 50V 0.1A (2X22K)SOT	2	TA	110 117 205 119 103
LM4016	IC 74HCT86 4X2-INPUT EX-OR S	6	ICA	204
LM4111	IC 4538BT	5	ICA	401
LM4114	IC 4050B HEX BUFER SO-16	6	ICA	301
LM4420	IC DUAL MODE EEPROM FOR DDC 2.	7	ICA	205
CB3059	CHIPCAP NP0 220P G 50V 0	2	CA	117
AC3388	CHIPRES 0W1 10K0 1% 0805 201	1	RA	154
AG3657	MF RES 0W5 383K F TC50 2,5	1	RA	113 114
AA0709	CF RES 0W25 33K J 2,5-7	1	RA	174
AA0721	CF RES 0W25 100K J 2,5-7	1	RA	176
AC4515	CHIPRES 0W1 56K 5% 0805 20	1	RA	177 179
AB0625	NF RES 0W25 10R J 2,5-7 CF	1	RA	181
AC3402	CHIPRES 0W1 14K0 1% 0805 201	1	RA	237

Part NO	Description	PG	Item Number	
CN2575	ELCAP 22UF M 16V RM5: 105'6X1	1	CA	531
CN2027	ELCAP 47U M 50V RM5: 105' 9X	2	CA	154
JF0067	DI 1N4007 1000V 1A	1	DA	116
AC3452	CHIPRES 0W1 46400R 1% 0805 201	1	RA	122
AG3629	MF RES 0W5 196K F TC50 2,5X	1	RA	139
AC3452	CHIPRES 0W1 46400R 1% 0805 201	1	RA	137
AC5415	chipres 56k		RA	177
AC3282	CHIPRES 0W1 787R 1% 0805 2013	1	RA	522 523
AC3364	CHIPRES 0W1 5620R 1% 0805 2013	1	RA	138
CB9050	*NEW*CHIPCAP 820P G 100V NP0 1	3	CA	212
SE2761	MICROPHONE CABLE 447R L=700			
QK0530	WIRE CONN BODY 1X02 2,5 CRIMP	2		006
QK0823	CRIMP CONTACT FOR MKH-SERIE	1		005
QP0002	MICROPH.ELECT.COND.D=9.7MM -47			002
UG1033	MICROPHONE TUBE(CAMERA) DTC 44	3		004
UL0711	GASKET, SILICON 447Z DN40	2		003
SE2766	EXT MIC WIRE 447R AUDIO			
QK0530	WIRE CONN BODY 1X02 2,5 CRIMP	2		004
QK0823	CRIMP CONTACT FOR MKH-SERIE	1		002
QK0824	WIRE CONN BODY 1X03 2,5 CRIMP	2		003
SE2687	FLAT CABLE VERTICALE 3-POLE 4			
SE2747	GROUNDING WIRE 446B/447U			
QK1081	BLADE CONN 4,8MM FEMALE	1		002
QK1651	BLADE CONNECTOR "MIKROLOK" 6,3	1		003
SE2679	GROUNDING WIRE 447S			
QK1446	WIRE TERMINAL FOR 1,85MM HOLES	1		003
QK1651	BLADE CONNECTOR "MIKROLOK" 6,3	1		002
UC1140	COOLING PLATE DN CU			



	SMA231	SMA247	
M103	FM3407	FM3410	FM3413
-V_VERT	-10V	-12V	-13V
-V_AUDIO	-10V	-12V	-13V
+V_AUDIO	+10V	+12V	+13V
R142	5R6/2W	22R/2W	22R/2W
R143	N.C	22R/2W	22R/2W
R158	10k	12k	12k
R137	46k4	33k2	46k4
R138	5k62	4k64	5k62

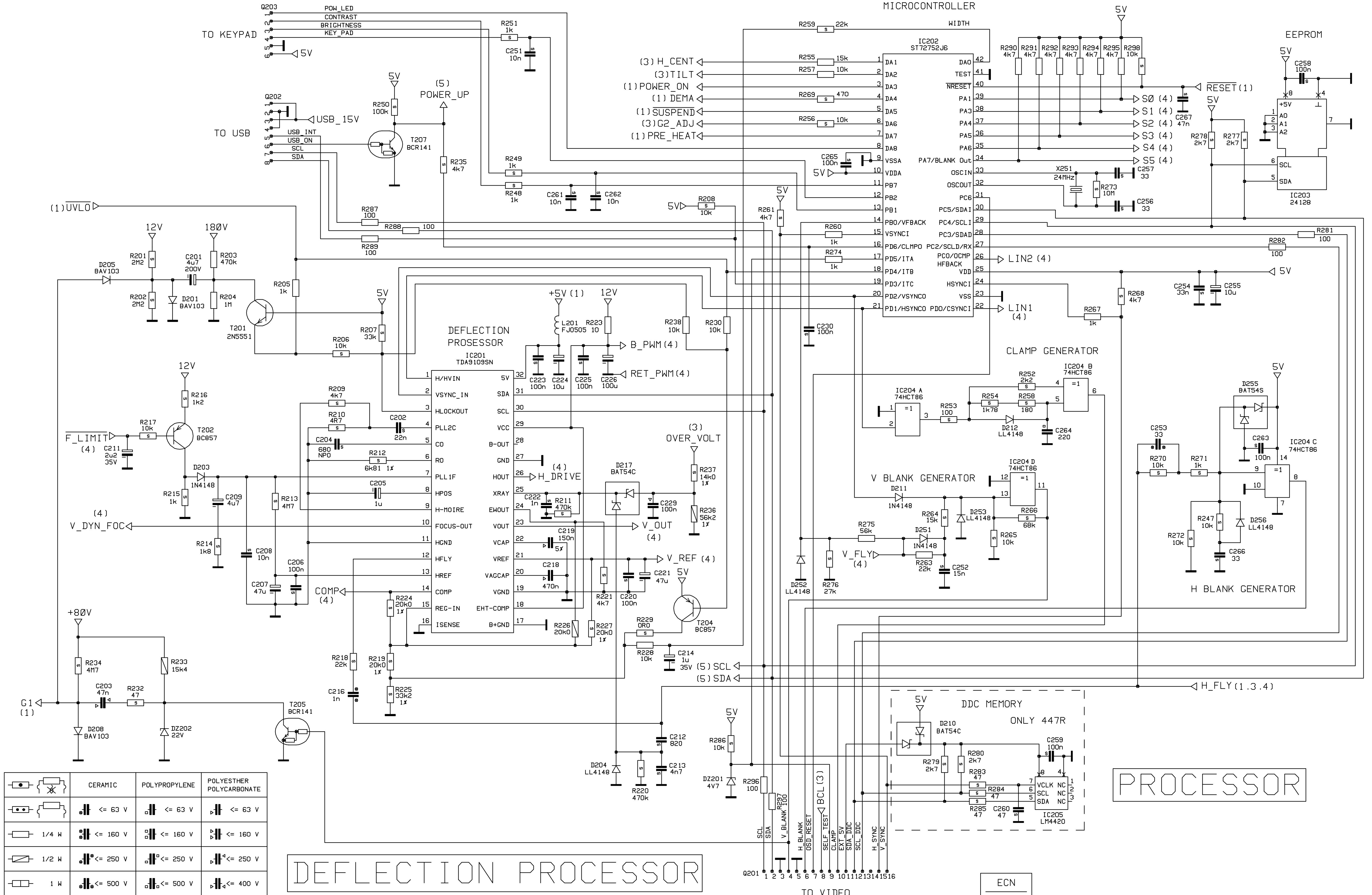
NB. Safety components marked with ⚠ must be replaced with original or approved components only.

All printed boards and the back cover are also safety components

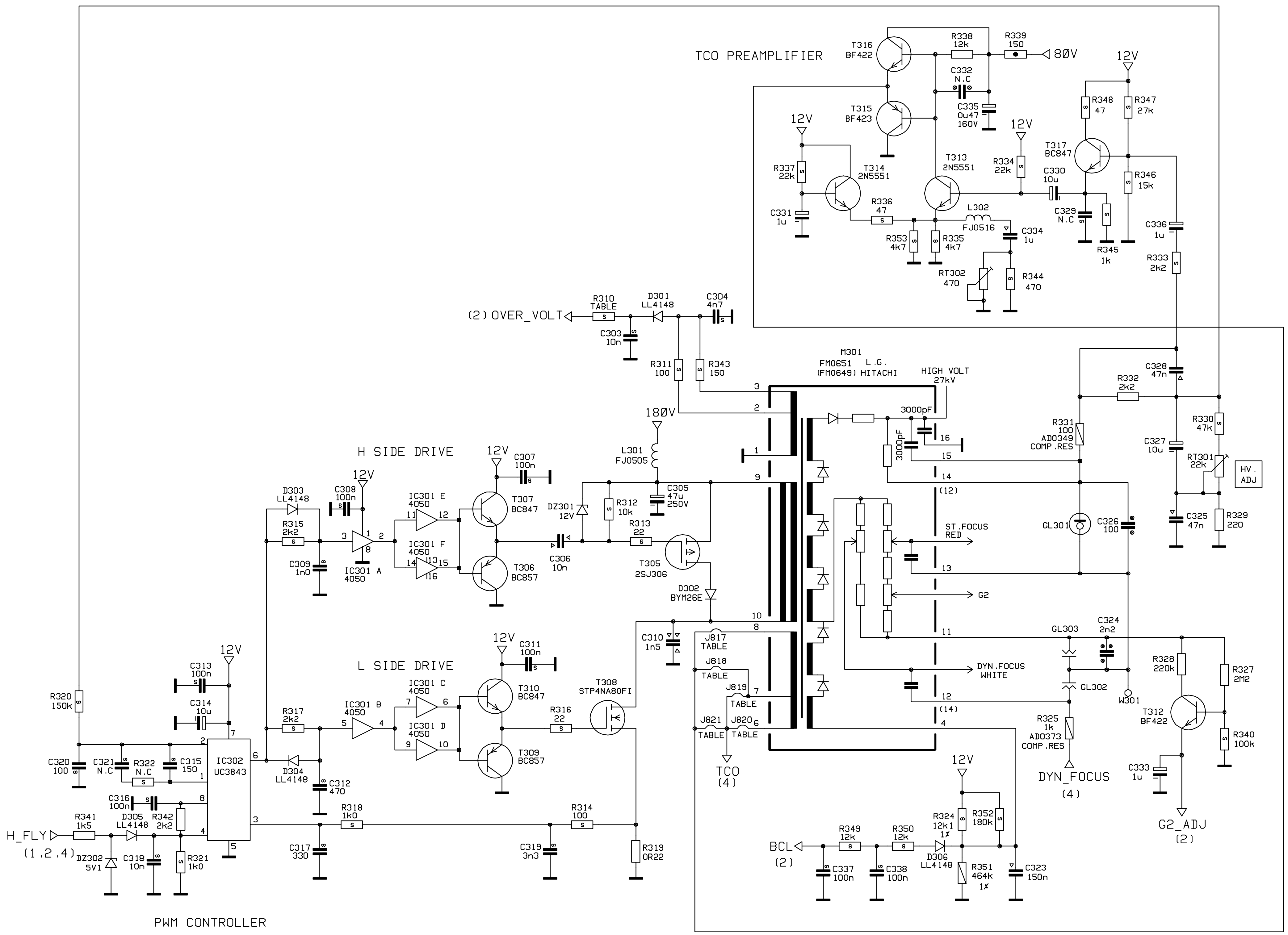
	CERAMIC	POLYPROPYLENE	POLYESTHER POLYCARBONATE
	<= 63 V	<= 63 V	<= 63 V
1/4 W	<= 160 V	<= 160 V	<= 160 V
1/2 W	<= 250 V	<= 250 V	<= 250 V
1 W	<= 500 V	<= 500 V	<= 400 V
2 W	<= 1,5 kV	<= 1,5 kV	<= 1,5 kV

SMA231B 1

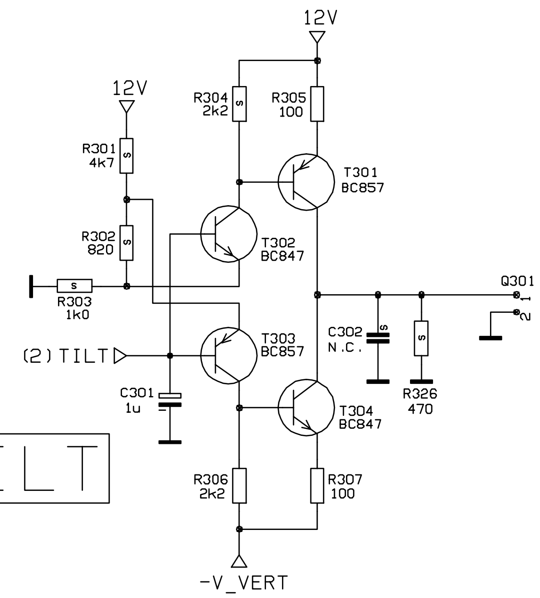
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	CERAMIC	POLYPROPYLENE	POLYESTHER POLYCARBONATE
	<= 63 V	<= 63 V	<= 63 V
	<= 63 V	<= 63 V	<= 63 V
1/4 W	<= 160 V	<= 160 V	<= 160 V
1/2 W	<= 250 V	<= 250 V	<= 250 V
1 W	<= 500 V	<= 500 V	<= 400 V
2 W	<= 1,5 kV	<= 1,5 kV	<= 1,5 kV



TILT AMPLIFIER



TILT

JUMPER ALTERNATIVES

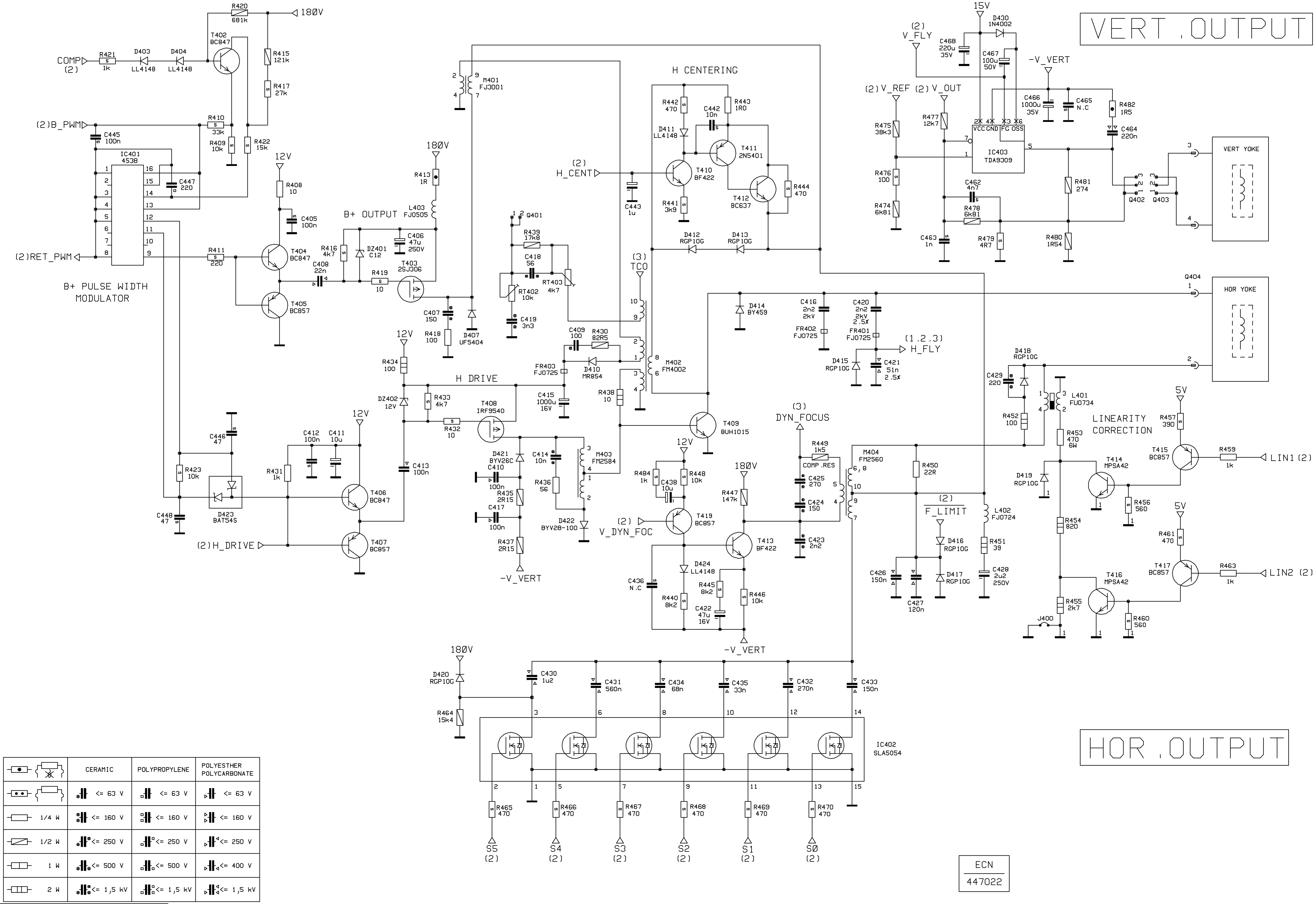
M301	FM0649	FM0651
J817	C.	N.C.
J818	N.C.	N.C.
J819	N.C.	N.C.
J820	C.	N.C.
J821	N.C.	C.
R310	2k2	4k7

	CERAMIC	POLYPROPYLENE	POLYESTHER POLYCARBONATE
	<= 63 V	<= 63 V	<= 63 V
1/4 W	<= 160 V	<= 160 V	<= 160 V
1/2 W	<= 250 V	<= 250 V	<= 250 V
1 W	<= 500 V	<= 500 V	<= 400 V
2 W	<= 1,5 kV	<= 1,5 kV	<= 1,5 kV

HV GENERATOR

ECN
447022

SMA231B 1
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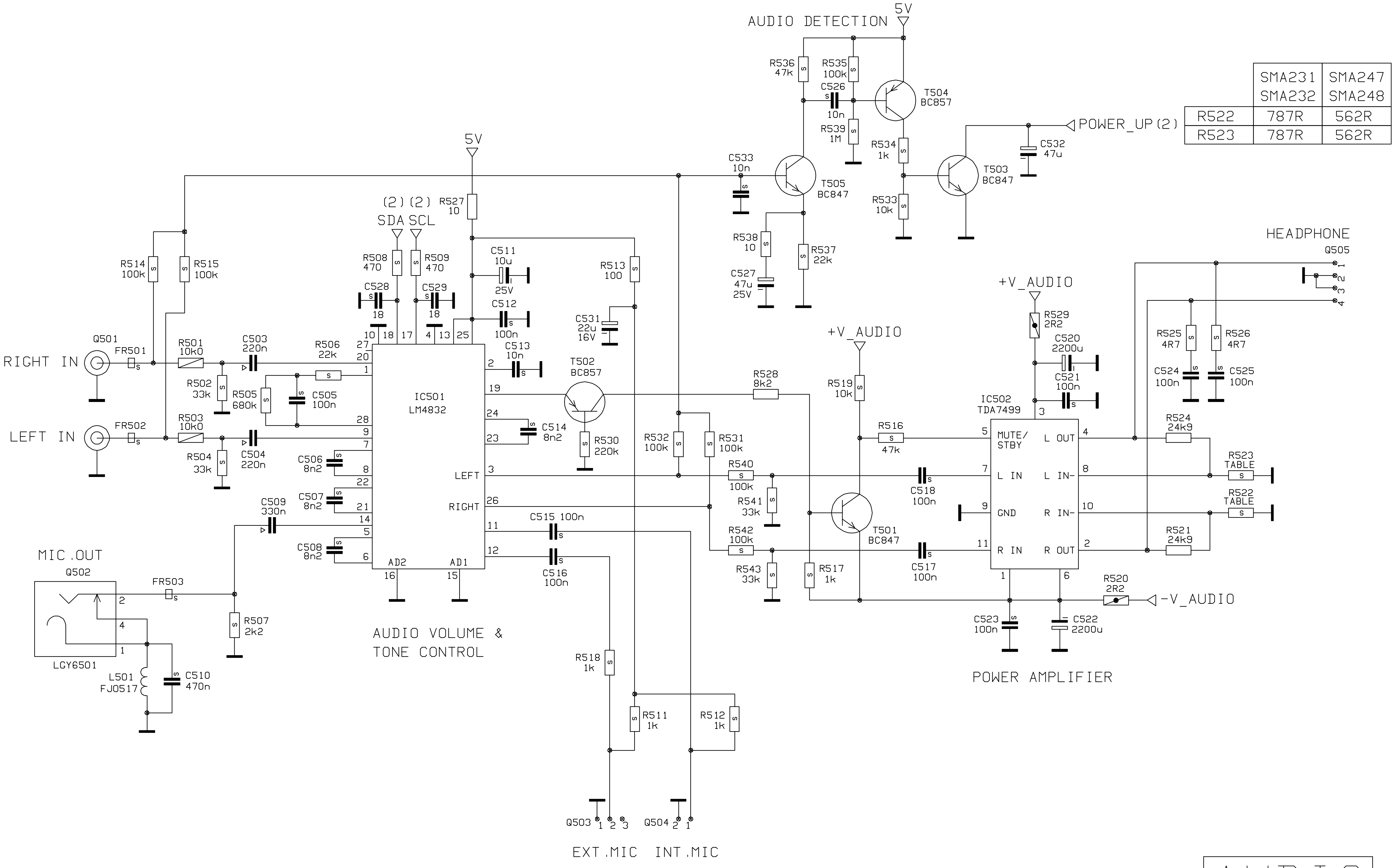


ECN
447022

SMA231B

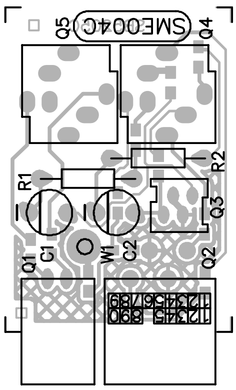
1

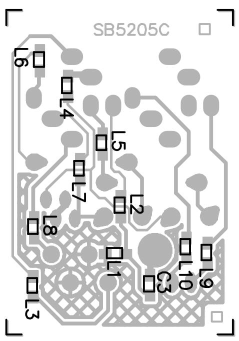
SB5241 09.99 Page 12

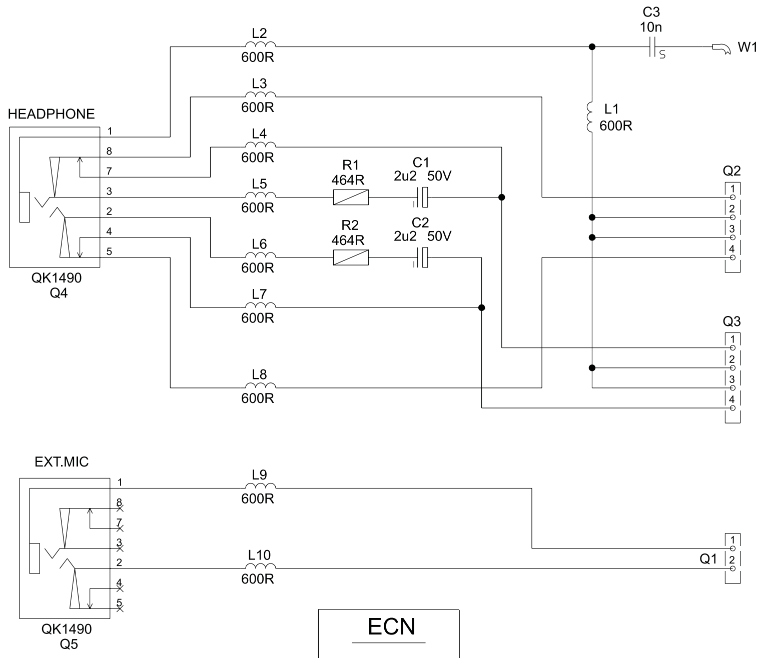


	SMA231 SMA232	SMA247 SMA248
R522	787R	562R
R523	787R	562R

Part NO	Description	Item Number		PG
AG3365	MF RES 0W5 464R F TC50 2,5-7	RE	001	1
AG3365	MF RES 0W5 464R F TC50 2,5-7	RE	002	1
CN2020	ELCAP 2U2 M 50V RM5: LL 6*12	CE	001	2
CN2020	ELCAP 2U2 M 50V RM5: LL 6*12	CE	002	2
CC3320	CHIPCERCAP X7R 10N 10% 50V 0805	CE	003	1
FA4000	CHIP INDUCTOR 600OHM 200MA 0805	LE	001	1
FA4000	CHIP INDUCTOR 600OHM 200MA 0805	LE	002	1
FA4000	CHIP INDUCTOR 600OHM 200MA 0805	LE	003	1
FA4000	CHIP INDUCTOR 600OHM 200MA 0805	LE	004	1
FA4000	CHIP INDUCTOR 600OHM 200MA 0805	LE	005	1
FA4000	CHIP INDUCTOR 600OHM 200MA 0805	LE	006	1
FA4000	CHIP INDUCTOR 600OHM 200MA 0805	LE	007	1
FA4000	CHIP INDUCTOR 600OHM 200MA 0805	LE	008	1
FA4000	CHIP INDUCTOR 600OHM 200MA 0805	LE	009	1
FA4000	CHIP INDUCTOR 600OHM 200MA 0805	LE	010	1
QK0923	ROW CONN 1X02 2,5 HOR	QE	001	2
QK1264	ROW CONN 1X04 2,5 HOR/STG	QE	002	3
QK1490	MINIATURE JACK 3.5MM VERT GREY 7W	QE	004	8
QK1490	MINIATURE JACK 3.5MM VERT GREY 7W	QE	005	8
QM1051	PICOFLEX ASSY BI-IDC 4-POS 450 MM	QE	003	6







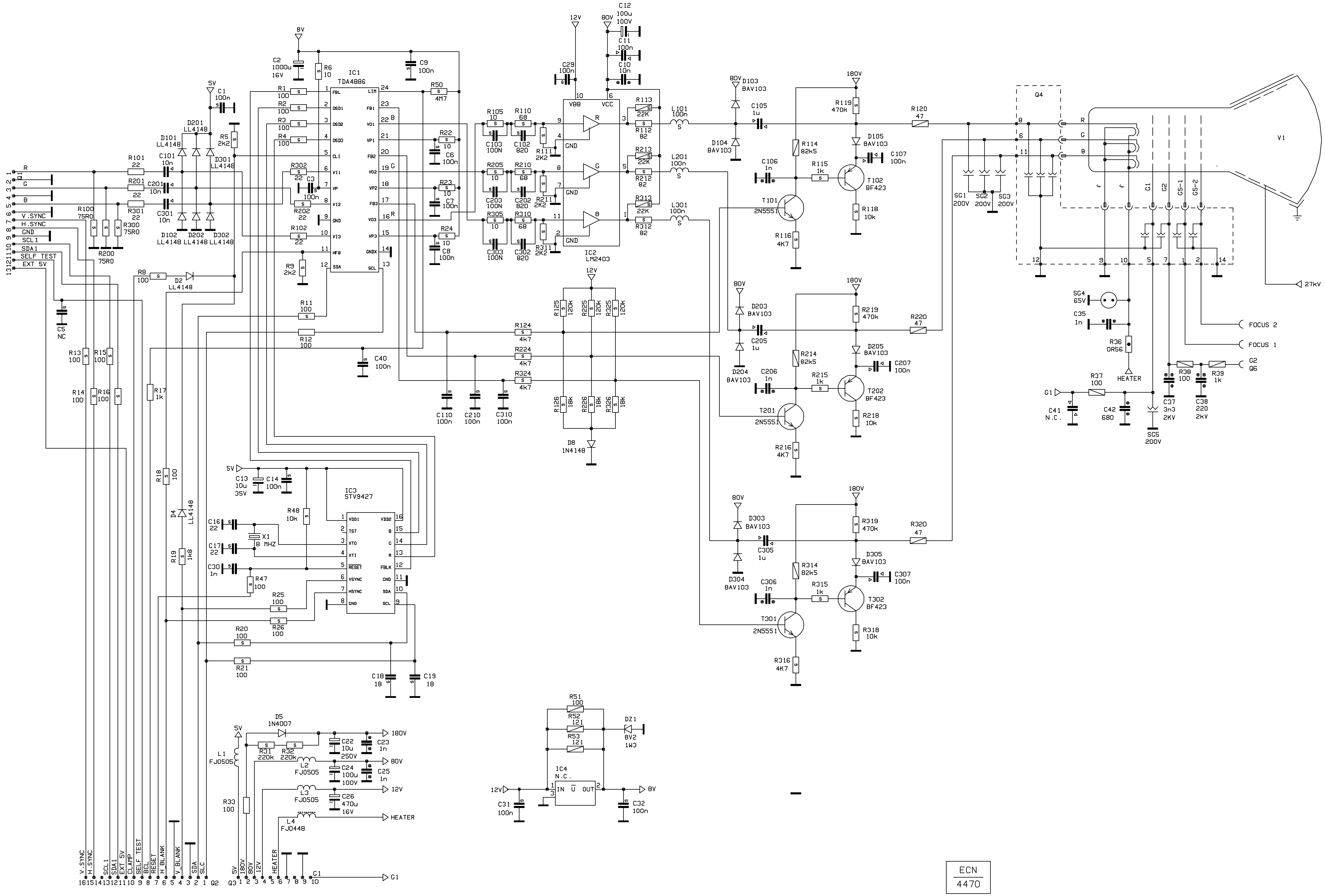
ECN

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SME004

1

SB5205 04.99 Page 1



ECN
4470

SMH156

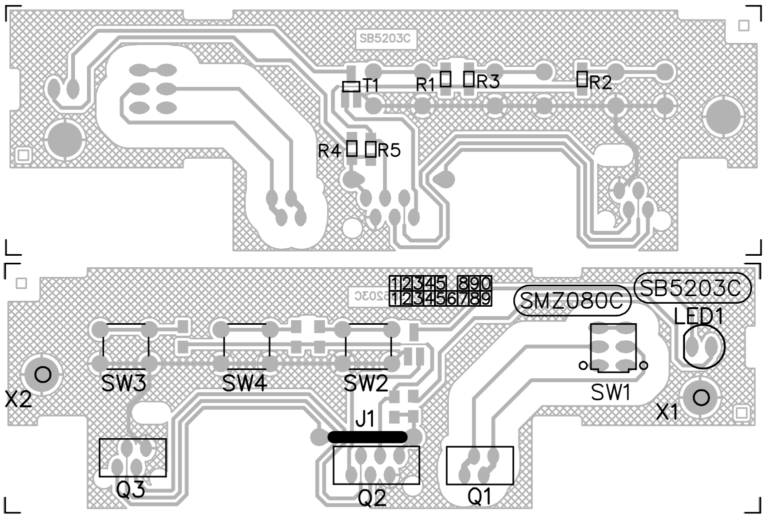
SB5201 02.99 Page 3

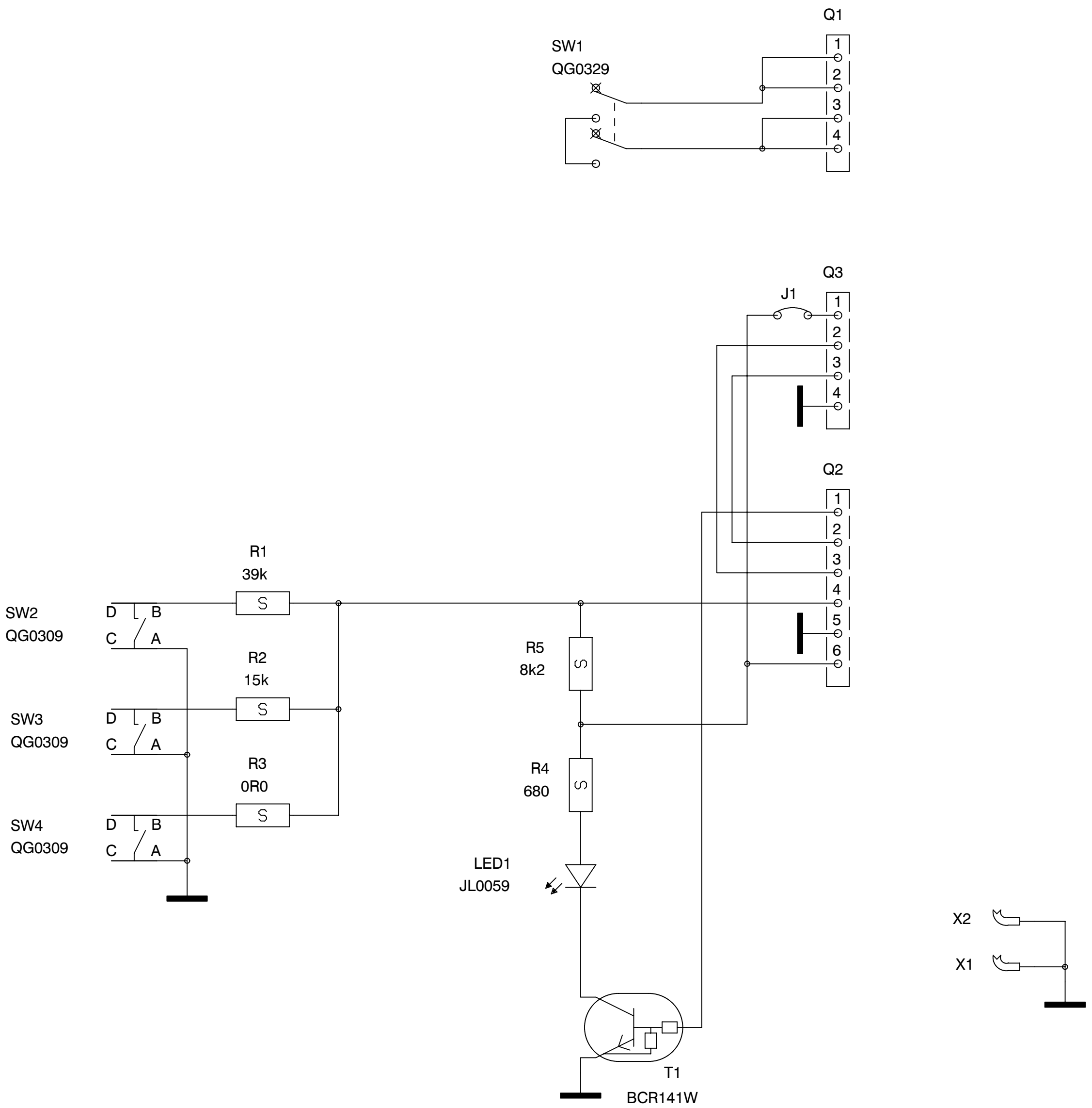
Part NO	Description	Item Number		PG
CC3480	CHIP CERCAP X7R 10% 100N 25V 0805	CH	001	2
CN2712	ELCAP 1000U M 16V RM5: 105'11X21	CH	002	5
CC3480	CHIP CERCAP X7R 10% 100N 25V 0805	CH	003	2
CC3480	CHIP CERCAP X7R 10% 100N 25V 0805	CH	006	2
CC3480	CHIP CERCAP X7R 10% 100N 25V 0805	CH	007	2
CC3480	CHIP CERCAP X7R 10% 100N 25V 0805	CH	008	2
CC3480	CHIP CERCAP X7R 10% 100N 25V 0805	CH	009	2
CK1388	PESCAP MKT 10N K 250V Y7,5 040911	CH	010	2
CK0283	PESCAP MKT 100N K 250V Y5 070812	CH	011	2
CN2546	ELCAP 100UF M 100V RM5 105' 14X21	CH	012	2
CN2032	ELCAP 10U M 50V RM5: 105' 6X12	CH	013	1
CC3480	CHIP CERCAP X7R 10% 100N 25V 0805	CH	014	2
CB3133	CHIPCERCAP NP0 22P 50V J 0805	CH	016	1
CB3133	CHIPCERCAP NP0 22P 50V J 0805	CH	017	1
CB3131	CHIPCERCAP NP0 18P 50V J 0805	CH	018	1
CB3131	CHIPCERCAP NP0 18P 50V J 0805	CH	019	1
CN2040	ELCAP 10U M 250V RM5 105' 10X16	CH	022	3
CC0200	CERCAP Y5P 1N0 K 500V Y5: D9	CH	023	1
CN2546	ELCAP 100UF M 100V RM5 105' 14X21	CH	024	2
CC0200	CERCAP Y5P 1N0 K 500V Y5: D9	CH	025	1
CN2642	ELCAP 470U M 16V RM5: 105' 11X21	CH	026	4
CC3480	CHIP CERCAP X7R 10% 100N 25V 0805	CH	029	2
CB3175	CHIPCERCAP NP0 1N0 50V J 0805	CH	030	3
CC3480	CHIP CERCAP X7R 10% 100N 25V 0805	CH	031	2
CC3480	CHIP CERCAP X7R 10% 100N 25V 0805	CH	032	2
CC0200	CERCAP Y5P 1N0 K 500V Y5: D9	CH	035	1
CA0350	CERCAP 3N3 K 2KV Y7,5	CH	037	3
CA0306	CERCAP Y5T 220P M 2KV Y7,5 D9	CH	038	2
CC3480	CHIP CERCAP X7R 10% 100N 25V 0805	CH	040	2
CC0190	CERCAP Y5P 680P K 500V Y5: D9	CH	042	1
CK2384	PESCAP MKT 10N K 63V Y5: 030708	CH	101	2
CB3173	CHIPCERCAP NP0 820P 50V J 0805	CH	102	1
CC3480	CHIP CERCAP X7R 10% 100N 25V 0805	CH	103	2
CK0465	PESCAP MKT 1U0 K 250V Y15 091818	CH	105	2
CC0200	CERCAP Y5P 1N0 K 500V Y5: D9	CH	106	1
CK0283	PESCAP MKT 100N K 250V Y5 070812	CH	107	2
CC3480	CHIP CERCAP X7R 10% 100N 25V 0805	CH	110	2
CK2384	PESCAP MKT 10N K 63V Y5: 030708	CH	201	2
CB3173	CHIPCERCAP NP0 820P 50V J 0805	CH	202	1
CC3480	CHIP CERCAP X7R 10% 100N 25V 0805	CH	203	2
CK0465	PESCAP MKT 1U0 K 250V Y15 091818	CH	205	2
CC0200	CERCAP Y5P 1N0 K 500V Y5: D9	CH	206	1
CK0283	PESCAP MKT 100N K 250V Y5 070812	CH	207	2
CC3480	CHIP CERCAP X7R 10% 100N 25V 0805	CH	210	2
CK2384	PESCAP MKT 10N K 63V Y5: 030708	CH	301	2
CB3173	CHIPCERCAP NP0 820P 50V J 0805	CH	302	1
CC3480	CHIP CERCAP X7R 10% 100N 25V 0805	CH	303	2
CK0465	PESCAP MKT 1U0 K 250V Y15 091818	CH	305	2
CC0200	CERCAP Y5P 1N0 K 500V Y5: D9	CH	306	1
CK0283	PESCAP MKT 100N K 250V Y5 070812	CH	307	2
CC3480	CHIP CERCAP X7R 10% 100N 25V 0805	CH	310	2
JF4005	DI LL4148 75V 150MA 4N (JF4006)	DH	002	1
JF4005	DI LL4148 75V 150MA 4N (JF4006)	DH	004	1
JF0067	DI 1N4007 1000V 1A	DH	005	1
JF0025	DI 1N4148 75V 200MA 4N	DH	008	1
JF4005	DI LL4148 75V 150MA 4N (JF4006)	DH	101	1
JF4005	DI LL4148 75V 150MA 4N (JF4006)	DH	102	1

Part NO	Description	Item Number		PG
JF4003	DI BAV103 200V 250MA 50NS SOD-80	DH	103	7
JF4003	DI BAV103 200V 250MA 50NS SOD-80	DH	104	7
JF4003	DI BAV103 200V 250MA 50NS SOD-80	DH	105	7
JF4005	DI LL4148 75V 150MA 4N (JF4006)	DH	201	1
JF4005	DI LL4148 75V 150MA 4N (JF4006)	DH	202	1
JF4003	DI BAV103 200V 250MA 50NS SOD-80	DH	203	7
JF4003	DI BAV103 200V 250MA 50NS SOD-80	DH	204	7
JF4003	DI BAV103 200V 250MA 50NS SOD-80	DH	205	7
JF4005	DI LL4148 75V 150MA 4N (JF4006)	DH	301	1
JF4005	DI LL4148 75V 150MA 4N (JF4006)	DH	302	1
JF4003	DI BAV103 200V 250MA 50NS SOD-80	DH	303	7
JF4003	DI BAV103 200V 250MA 50NS SOD-80	DH	304	7
JF4003	DI BAV103 200V 250MA 50NS SOD-80	DH	305	7
JH0103	ZDI BZX85B8V2 8.2V 1.3W 2%	DZH	001	2
LM1004	IC TDA4886 120MHZ RGB AMP I2C OSD	ICH	001	13
UC6752	WASHER 447E	ICH	002	1
WC0530	SCREW 2,9X10 YELLOW FE/ZN	ICH	002	2
XW0032	DC340 HEAT SINK,DOW CORNING	ICH	002	9
LM1002	IC LM2403T MONOL. TRIPLE CRT DRV.	ICH	002	22
UC7071	AL-PROFIILI 447R	ICH	002	9
LM0992	IC STV9427 OSD W.OUT PWM DIP16	ICH	003	16
FJ0505	CHOKE 15UH 5% TAPED AXIAL	LH	001	2
FJ0505	CHOKE 15UH 5% TAPED AXIAL	LH	002	2
FJ0505	CHOKE 15UH 5% TAPED AXIAL	LH	003	2
FJ0448	CHOKE 13UH FERRITE 2X15	LH	004	2
FA2004	CHIP COIL 100NH 10% SIZE 0805	LH	101	2
FA2004	CHIP COIL 100NH 10% SIZE 0805	LH	201	2
FA2004	CHIP COIL 100NH 10% SIZE 0805	LH	301	2
QK1444	ROW CONN 1X13 2,54 VERT	QH	001	6
QK1707	PICOFLEX HEADER 1X16 1,27MM	QH	002	4
QK1704	PICOFLEX HEADER 1X10 1,27MM	QH	003	4
QK1606	CRT SOCKET FOR 17" HITACHI NEAT	QH	004	13
QK1715	BASE PIN COPPER 2.35X0.25X13.2	QH	006	2
AC4449	CHIPRES 0W1 100R 5% 0805 2013	RH	001	1
AC4449	CHIPRES 0W1 100R 5% 0805 2013	RH	002	1
AC4449	CHIPRES 0W1 100R 5% 0805 2013	RH	003	1
AC4449	CHIPRES 0W1 100R 5% 0805 2013	RH	004	1
AC4481	CHIPRES 0W1 2K2 5% 0805 2013	RH	005	1
AC4425	CHIPRES 0W1 10R 5% 0805 2013	RH	006	1
AC4449	CHIPRES 0W1 100R 5% 0805 2013	RH	008	1
AC4481	CHIPRES 0W1 2K2 5% 0805 2013	RH	009	1
AC4449	CHIPRES 0W1 100R 5% 0805 2013	RH	011	1
AA0649	CF RES 0W25 100R J 2,5-7	RH	012	1
AC4449	CHIPRES 0W1 100R 5% 0805 2013	RH	013	1
AC4449	CHIPRES 0W1 100R 5% 0805 2013	RH	014	1
AC4449	CHIPRES 0W1 100R 5% 0805 2013	RH	015	1
AC4449	CHIPRES 0W1 100R 5% 0805 2013	RH	016	1
AA0697	CF RES 0W25 10K J 2,5-7	RH	017	1
AC4449	CHIPRES 0W1 100R 5% 0805 2013	RH	018	1
AC4479	CHIPRES 0W1 1K8 5% 0805 2013	RH	019	1
AC4449	CHIPRES 0W1 100R 5% 0805 2013	RH	020	1
AC4449	CHIPRES 0W1 100R 5% 0805 2013	RH	021	1
AC4425	CHIPRES 0W1 10R 5% 0805 2013	RH	022	1
AC4425	CHIPRES 0W1 10R 5% 0805 2013	RH	023	1
AC4425	CHIPRES 0W1 10R 5% 0805 2013	RH	024	1
AC4449	CHIPRES 0W1 100R 5% 0805 2013	RH	025	1
AC4449	CHIPRES 0W1 100R 5% 0805 2013	RH	026	1

Part NO	Description	Item Number	PG
AC4529	CHIPRES 0W1 220K 5% 0805 2013	RH 031	1
AC4529	CHIPRES 0W1 220K 5% 0805 2013	RH 032	1
AA0649	CF RES 0W25 100R J 2,5-7	RH 033	1
AB0595	NF RES 0W25 0R56 J 2,5-7 CF	RH 036	1
AD0349	COMPRES 0W5 100R K 4-11	RH 037	1
AD0349	COMPRES 0W5 100R K 4-11	RH 038	1
AD0373	COMPRES 0W5 1K0 K 4-11	RH 039	1
AC4449	CHIPRES 0W1 100R 5% 0805 2013	RH 047	1
AC4497	CHIPRES 0W1 10K 5% 0805 2013	RH 048	1
AC4561	CHIPRES 0W1 4M7 5% 0805 2013	RH 050	1
AG3301	MF RES 0W5 100R F TC50 2,5-7	RH 051	1
AG3309	MF RES 0W5 121R F TC50 2,5-7	RH 052	1
AG3309	MF RES 0W5 121R F TC50 2,5-7	RH 053	1
AC3584	CHIPRES 0W1 75R 1% 0805 2013	RH 100	1
AA0633	CF RES 0W25 22R J 2,5-7	RH 101	1
AC4433	CHIPRES 0W1 22R 5% 0805 2013	RH 102	1
AC4425	CHIPRES 0W1 10R 5% 0805 2013	RH 105	1
AC4445	CHIPRES 0W1 68R 5% 0805 2013	RH 110	1
AC4481	CHIPRES 0W1 2K2 5% 0805 2013	RH 111	1
AC4449	CHIPRES 0W1 100R 5% 0805 2013	RH 112	1
AC0180	CHIPRES 0W5 22K J 2010	RH 113	1
AG3589	MF RES 0W5 82K5 F TC50 2,5-7	RH 114	1
AC4473	CHIPRES 0W1 1K0 5% 0805 2013	RH 115	1
AC4489	CHIPRES 0W1 4K7 5% 0805 2013	RH 116	1
AC4497	CHIPRES 0W1 10K 5% 0805 2013	RH 118	1
AC8737	CHIPRES 0W12 470K J 1206 3216	RH 119	1
AD0341	COMPRES 0W5 47R K 4-11	RH 120	1
AC4489	CHIPRES 0W1 4K7 5% 0805 2013	RH 124	1
AC4523	CHIPRES 0W1 120K 5% 0805 2013	RH 125	1
AC4503	CHIPRES 0W1 18K 5% 0805 2013	RH 126	1
AC3584	CHIPRES 0W1 75R 1% 0805 2013	RH 200	1
AA0633	CF RES 0W25 22R J 2,5-7	RH 201	1
AC4433	CHIPRES 0W1 22R 5% 0805 2013	RH 202	1
AC4425	CHIPRES 0W1 10R 5% 0805 2013	RH 205	1
AC4445	CHIPRES 0W1 68R 5% 0805 2013	RH 210	1
AC4481	CHIPRES 0W1 2K2 5% 0805 2013	RH 211	1
AC4449	CHIPRES 0W1 100R 5% 0805 2013	RH 212	1
AC0180	CHIPRES 0W5 22K J 2010	RH 213	1
AG3589	MF RES 0W5 82K5 F TC50 2,5-7	RH 214	1
AC4473	CHIPRES 0W1 1K0 5% 0805 2013	RH 215	1

Part NO	Description	Item Number	PG
AC4489	CHIPRES 0W1 4K7 5% 0805 2013	RH 216	1
AC4497	CHIPRES 0W1 10K 5% 0805 2013	RH 218	1
AC8737	CHIPRES 0W12 470K J 1206 3216	RH 219	1
AD0341	COMPRES 0W5 47R K 4-11	RH 220	1
AC4489	CHIPRES 0W1 4K7 5% 0805 2013	RH 224	1
AC4523	CHIPRES 0W1 120K 5% 0805 2013	RH 225	1
AC4503	CHIPRES 0W1 18K 5% 0805 2013	RH 226	1
AC3584	CHIPRES 0W1 75R 1% 0805 2013	RH 300	1
AA0633	CF RES 0W25 22R J 2,5-7	RH 301	1
AC4433	CHIPRES 0W1 22R 5% 0805 2013	RH 302	1
AC4425	CHIPRES 0W1 10R 5% 0805 2013	RH 305	1
AC4445	CHIPRES 0W1 68R 5% 0805 2013	RH 310	1
AC4481	CHIPRES 0W1 2K2 5% 0805 2013	RH 311	1
AC4449	CHIPRES 0W1 100R 5% 0805 2013	RH 312	1
AC0180	CHIPRES 0W5 22K J 2010	RH 313	1
AG3589	MF RES 0W5 82K5 F TC50 2,5-7	RH 314	1
AC4473	CHIPRES 0W1 1K0 5% 0805 2013	RH 315	1
AC4489	CHIPRES 0W1 4K7 5% 0805 2013	RH 316	1
AC4497	CHIPRES 0W1 10K 5% 0805 2013	RH 318	1
AC8737	CHIPRES 0W12 470K J 1206 3216	RH 319	1
AD0341	COMPRES 0W5 47R K 4-11	RH 320	1
AC4489	CHIPRES 0W1 4K7 5% 0805 2013	RH 324	1
AC4523	CHIPRES 0W1 120K 5% 0805 2013	RH 325	1
AC4503	CHIPRES 0W1 18K 5% 0805 2013	RH 326	1
QT0052	SURGE PROTECTOR 200V R=5,0MM RAD	SGH 001	4
QT0052	SURGE PROTECTOR 200V R=5,0MM RAD	SGH 002	4
QT0052	SURGE PROTECTOR 200V R=5,0MM RAD	SGH 003	4
QT0217	GLIMM LAMP 65V 6*16MM	SGH 004	3
QT0052	SURGE PROTECTOR 200V R=5,0MM RAD	SGH 005	4
JM0273	TR 2N5551 NPN 160V 0,6A	TH 101	2
JM0205	TR BF423 P 250V 25MA 60M:	TH 102	3
JM0273	TR 2N5551 NPN 160V 0,6A	TH 201	2
JM0205	TR BF423 P 250V 25MA 60M:	TH 202	3
JM0273	TR 2N5551 NPN 160V 0,6A	TH 301	2
JM0205	TR BF423 P 250V 25MA 60M:	TH 302	3
QA0095	CRYSTAL 8,00 MHZ HC-49/U	XH 001	4
QK1651	BLADE CONNECTOR "MIKROLOK" 6,3MM	002	1
QK1571	GROUNDING SHEET CONN.	003	1
SB5201	PCB 447O SMH156 CEM1 2S 4P SB5201		17


SB5203C
T1
R1
R3
R2
R4
R5
12345 890
123456789
SMZ080C
SB5203C
LED1
SW3
SW4
SW2
SW1
X2
X1
J1
Q3
Q2
Q1


Q1
SW1
QG0329
1
2
3
4
Q3
J1
1
2
3
4
Q2
1
2
3
4
5
6
R1
39k
S
SW2
QG0309
D
B
C
A
R2
15k
SW3
QG0309
R3
0R0
SW4
QG0309
R5
8k2
R4
680
LED1
JL0059
X2
X1
T1
BCR141W

Part NO	Description	Item Number		PG
JL0059	LED GREEN TLHG6205 5MM	LEDZ	001	2
QK1701	PICOFLEX HEADER 1X04 1,27MM	QZ	001	3
QK1702	PICOFLEX HEADER 1X06 1,27MM	QZ	002	3
AC4511	CHIPRES 0W1 39K 5% 0805 2013	RZ	001	1
AC4501	CHIPRES 0W1 15K 5% 0805 2013	RZ	002	1
AC4493	CHIPRES 0W1 6K8 5% 0805 2013	RZ	003	1
AC4469	CHIPRES 0W1 680R 5% 0805 2013	RZ	004	1
AC4495	CHIPRES 0W1 8K2 5% 0805 2013	RZ	005	1
QG0329	MINIATURE PUSH SWITCH 0.1A 24VDC	SWZ	001	8
QG0309	PUSH-BUTTON SWITCH 12V 50MA MOM.	SWZ	002	3
QG0309	PUSH-BUTTON SWITCH 12V 50MA MOM.	SWZ	003	3
QG0309	PUSH-BUTTON SWITCH 12V 50MA MOM.	SWZ	004	3
JM4401	TR BCR141W 50V 0.1A (2X22K)SOT323	TZ	001	2